THE IRON TRADE REVIEW

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SOUND CONDITIONS

ARE PREVAILING WITH NO DANGER OF RUNAWAY MARKET.

Heavy Buying of Rails Resumed—Many Coke Contracts Made. Activity in Pig Iron in Chicago.

The danger of a runaway market is disappearing and conditions are thoroughly sound. The outlook is that while there will be no special excitement in the near future, all plants will continue fully as active as they have been for some time.

Heavy Buying at Chicago. The greatest activity in pig iron has been in the Chicago district, where the International Harvester Co. purchased 50,000 tons, 20,000 tons of which was placed with the Sloss-Sheffield Steel & Iron Co. at about $12.75, Birmingham, for No. 2 foundry; 7,500 tons with the Virginia Iron, Coal & Coke Co. at $14, furnace, for No. 2, or $16.65, Chicago, while the remainder, 22,500 tons, went to Northern furnaces, of which the Iroquois Furnace Co., of South Chicago, got a large portion. There is now only one important company in the South quoting $12.50, and very little iron can be purchased at less than $13. It is confidently expected that the $13 basis will be established this week.

Northern Pig Iron Prices. In the North, pig iron prices are somewhat irregular. While some furnaces are still selling at $15.25 at their plants, the number quoting $16 or higher is increasing, and in Cleveland and other markets it is difficult to buy iron at less than $16.25, delivered. The two leading sellers of Bessemer are still out of the market and expect to obtain $15.50 when they again enter, but some Bessemer can be purchased at $15.25, valley. It is probable that some heavy sales of Bessemer will be made at an early day.

Contracting for Coke. Coke continues an important factor. Many contracts have been made for furnace coke; some for the first half of next year, and others for the entire year at from $2.50 to $2.75 for standard Connellsville. For high grade foundry coke $3 is the lowest quotation obtainable, while some producers quote as high as $3.50.

Heavy Sales of Steel Rails. The buying of steel rails, which had not been very active for several weeks, amounted to fully 240,000 tons last week, not including the large purchase made by the New York Central, of which details are not announced. The principal sales were as follows: Northern Pacific, 80,000 tons; Louisiana Railway & Navigation Co., 5,000; Great Northern, 35,000; Minneapolis & St. Louis, 29,000; Ocean Shore, 8,000; Kansas City, Mexico & Orient, 13,000.

Structural Material. The demand for structural material continues unabated, and efforts to enthuse life into the strike of structural workers seem to have had little effect. Among the recent large orders for bridge material was one for 16,000 tons from the Atchison, Topeka & Santa Fe railroad. The leading producers of shapes, which are not accepting premiums, will not guarantee shipments in less than four to six months. While the demand for plates is also strong, it is easier to obtain prompt shipments, especially from Eastern mills.

Bars for Car Builders. Car builders are very prominent in contracting for bars and in making specifications on old contracts. Bar iron is firm at recent quotations, and it is still expected that there will be an advance on steel bars at an early day. An advance is also expected on hoops.

Contracts for Line Pipe. Several large contracts for line pipe have recently been made, and it is expected that other large transactions will soon be completed. Line pipe has advanced from $1 to $2 per ton in the past two or three weeks.

Crude Steel Very Scarce. Attention is again being called to the scarcity of crude steel. Inquiries have come from three consuming interests for a total of 1,800 tons of billets for delivery during the first quarter of next year. Mills are slow to quote for this delivery. A sale of 200 tons of open-hearth billets for immediate delivery at Pittsburg at $26.85 indicates the strength of the market.

Competition in Sheets. There is excellent demand for sheets, but the prices continue irregular. In some places the independent interests have not been prominent, but competition among jobbers has reduced prices from stock.

Old Material Is Strong. The scrap market continues strong and in the Pittsburg district the consumer who came into the market for 4,000 tons of heavy metal scrap for immediate delivery, had to pay about $16.50, delivered.

Southern Price Advanced.

(Special Telegram.)

Pittsburg, Pa., Oct. 11.—One large Southern producer which has been selling only for delivery after April 1, last night advanced its price for such delivery from $13 to $13.50, basis No. 2, Birmingham. There is very little $12.50 iron that is chiefly for this year. Purchases made here by a concern which has a Louisville factory aggregate 4,200 tons, all for Louisville, first quarter, all at $12.50, divided among three sellers. Southern market will likely be squarely $13 very soon.

THE WEEK IN IRON CENTERS.

PITTSBURG.

Demand not so Bright, but Conditions Sound—Large Pipe Contracts.

OFFICE OF *The Iron Trade Review*,
521 PARK BUILDING, October 11.

Buying of pig iron in the local market has not been very heavy in the past week, and it is a matter of comment that consumers in other districts have recently covered much further ahead than have the bulk of Pittsburg interests. Some furnaces have made large advances, while the whole market is slightly higher.

Billets are scarcely obtainable for delivery this year, and inquiries for a total of 18,000 tons of open-hearth billets have just come out for the first quarter of next year, on which $25 or higher will be quoted.

Some good line pipe contracts have just been taken, and others are being figured upon. Line pipe has advanced from $1 to $2 a ton in the past two or three weeks, and all other oil country goods are higher, some lines by as much as $5 a ton. Merchant pipe continues very active, a round tonnage being booked by the leading interest at the new official prices. The independents, generally speaking, have been sold up for two or three weeks.

Individual rail orders are small in tonnage, but foot up a respectable aggregate, the local mill having last week booked about 50,000 tons. Light rails are very firm. Some large rail contracts are expected within a month.

It is still probable that merchant steel mill products will be advanced this month, merchant bars being put up perhaps $3 per ton, and hoops $2 a ton in addition to the recent advance of a like amount. Plates are also in line for an advance.

The general movement in finished steel products is not as heavy as it was during September, but still foots up a very satisfactory tonnage. There is less danger of a runaway market than there was, but just as good promise for full engagement of all productive capacity through the first half of next year if not longer.

Coke continues extremely firm and prices are a trifle higher than a week ago. Heavy melting stock is 50 cents higher, due to a cleaning up of a few odd lots by one consumer, which illustrates the sensitiveness of this line.

Pig Iron.—Standard Sanitary, Adams, and one or two other local consumers have placed round contracts in the past week for foundry iron, chiefly for delivery in the first quarter of next year. There was sharp bidding on some of the inquiries, and prices done in a few cases represented no advance whatever on our quotations a week ago, but rather the reverse. On other sales, however, slight advances have been scored, and the whole foundry iron market can be reported a trifle firmer. A few small lots for early shipment, particularly where the buyer insisted on a particular brand, went at comparatively fancy figures, the extreme being represented by a couple of carloads of standard No. 2, of a particular brand, which went at $17.50, delivered Pittsburg. We quote No. 2 foundry iron in the open market at $15.25, furnace, or 25 cents above last week. Some furnaces, however, are asking all the way to $16.50, being well sold up for a few months. In Bessemer iron there has been some buying and the market is firmer, while there is expected to be a larger movement within the next few weeks to large steel producers. While the two leading sellers continue out of the market, expecting to obtain $15.50 or more at furnace, it is positively asserted that there is a good bit of Bessemer to be had at $15.25, valley, or possibly a trifle less, for ordinary delivery. Bessemer for spot shipment is quite scarce, and there has been considerable skirmishing to meet deliveries promised. Whatever the bearing may be on the general situation, it is a fact that some basic iron is being shipped to the steel corporation on contracts recently placed for Bessemer. We revise prices slightly as follows:

Bessemer, Valley	$15.25 to $15.50
Bessemer, Pittsburg	16.10 to 16.35
No. 1 Foundry, Pittsburg	16.60 to 16.85
No. 2 Foundry, Pittsburg	16.10 to 16.35
Gray Forge, Pittsburg	15.25 to 15.35
Basic, Valley	15.25 to 15.50
Basic, Pittsburg	16.10 to 16.35

Ferro-Manganese.—The market continues extremely firm for any early delivery, on which we quote $55 to $56. On extended delivery large lots are about $54, all prices being delivered Pittsburg. There is no domestic ferro for sale.

Billets.—Inquiries have just come into the market from three consuming interests for a total of 18,000 tons of open-hearth billets for delivery in the first quarter of next year. Mills are not anxious to quote on this delivery, and it is almost certain that nothing below $25 at mill will be done on this business if it is put through. For delivery this year there is scarcely any steel to be had. We note a sale of a lot of 200 tons of open-hearth at $26.85 for immediate delivery at Pittsburg. A merchant firm which recently sold out its line of Bessemer billets immediately endeavored to buy some of the steel back again, without success. The leading interest is selling practically no crude steel of any description. We quote the following prices as largely nominal, but representing the absolute minimum of what might be done, for delivery any time this year: Soft Bessemer billets, $25; open-hearth, $26; forging billets, $28, all f. o. b. Pittsburg. Wire rods are about $32, Pittsburg, and open-hearth chain rods about $2 higher. Sheet bars are nominally $26 or higher, but there have been no recent transactions of moment.

Muck Bar.—Transactions are light, mills being well sold up. The last sale reported was at $28, delivered Pittsburg, for early shipment, and quotations range from this to $28.50, delivered Pittsburg.

Skelp.—The market continues very firm, producers being well sold up through this year.

We quote prices unchanged as follows: Bessemer steel, grooved, 1.55c; sheared, 1.60c; open-hearth, grooved, 1.60c; sheared, 1.65c; iron, grooved, 1.60c to 1.65c; sheared, 1.65c to 1.70c.

Rails and Track Material.—The local mill booked about 50,000 tons of standard rails during last week. No large orders are being placed just now, but there is a great deal of small buying. Another lot of large contracts from large railroads is expected within a month or so, which should fill all the mills pretty well through the year and enable them to lay their plans well in advance. The Western and Southern rail mills are already sold up until nearly the close of the year. Light rails are very firm at our previous quotations, and in some cases higher prices are paid on small lots for very early delivery. At regular prices some mills making light rails from new steel cannot make deliveries inside of two or three months. We quote:

Fifty pounds and heavier, 500-ton lots and over, $28; carload lots and less than 500 tons, $30; less than carload lots, $32; light rails, 16-lb., $29 to $30; 20-lb., $27.50 to

$28; 25 to 45-lb., $26; angle bars for standard sections, 1.35c; spikes, 1.75c to 1.85c.

Plates.—Buying continues good and mills are gradually filling up for the first half of next year. An advance is still in prospect this month. A considerable amount of business for early delivery is going to Eastern mills, despite the extra freight, as local mills cannot make any early deliveries. We quote regular mill prices unchanged as follows:

Tank plates, ¼ in. thick, 6¼ in. to 100 in., 1.60c f. o. b. mill Pittsburg. Extras are as follows per 100 lb.: Flange and boiler steel, 10c; marine, A. B. M. A. and ordinary fire box, 20c; still bottom, 30c; locomotive fire box, 50c; plates over 100 in. up to 110 in. in width not less than 5c extra; plates 110 in. to 115 in. wide, not less than 10c extra; 115 to 120 in., 15c extra; plates 120 in. to 125 in. wide, not less than 25c extra; plates 125 in. to 130 in., not less than 50c extra; plates 130 in. wide, not less than $1 extra; plates 3-16 in. thick, 10c extra; gauges 7 and 8, 15c extra; No. 9, 25c extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all points of delivery in the United States except Pacific Coast.

Merchant Bars.—Tonnage continues very good in merchant bars and hoops and bands. The prospects are that there will be an advance in merchant steel mill products at an early date, hoops being advanced possibly $2 a ton, despite the fact that they were recently advanced $2 a ton, merchant steel bars being advanced possibly a trifle more than hoops. Demand for iron bars continues very good, with prices firm. We quote: Common iron bars, 1.70c, Youngstown; 1.75c, Pittsburg; hoops, 1.75c, and bands, 1.50c; taking hoop and band extras, respectively. Bessemer steel bars, 1.50c; open-hearth steel bars, 1.50c; plow and cultivator, 1.50c, net; channels, angles, zees and tees under 3 in., 1.60c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 lb., 10 cents advance; less than 1,000 lb. of a size, 30 cents advance.

Structural Material.—Contracts are being placed with mills in good volume for next year, chiefly on definite undertakings, while some running contracts are being made for limited periods. The strike of outside structural iron workers in the Pittsburg district against the American Bridge Co., inaugurated last August, is still technically in force, but the number of men originally affected was very small. They have nearly all secured employment elsewhere, while the only important contract which the bridge company had in this district was that for the Government on one of the Monongahela locks, and the Government has taken this job off its hands. Local mills cannot make shipment on new business until some time well into next year, and there are scarcely any stocks of any description to be found anywhere, so that new work must perforce wait on the mills. We quote regular mill prices unchanged as follows:

Beams and channels 15 in. and under, 1.70c; over 15 in., 1.80c; zees, 1.70c; tees, 1.75c; angles, from 3 to 8 in. inclusive. 1.70c; universal and sheared plate, 6¼ in. and wider, 1.60c, base.

Sheets.—Some additional independent sheet mills have withdrawn from the market at the minimum prices, which have been ruling, and the market is proportionately firmer, although it is still possible to do about the same prices as a week ago. On carloads for mill shipment, with desirable specifications, we quote 2.25c to 2.30c on black and 3.30c to 3.35c on galvanized, No. 28 gauge. On the largest lots not more than a dollar a ton below the lower of these figures could be done.

We quote the official prices as follows, these being quite nominal but well representing the differentials between gauges:

No. 30, 2.65c; No. 29, 2.55c; No. 28, 2.40c; No. 27, 2.30c; Nos. 25-26, 2.25c; Nos. 22-24, 2.20c; Nos. 17-21, 2.15c; Nos. 15-16, 2.10c; Nos. 13-14, 2.05c; Nos. 10-12, 2c. Galvanized, Nos. 10-11, 2.35c; Nos. 12-14, 2.45c; Nos. 15-16, 2.55c; Nos. 17-21, 2.70c; Nos. 22-24, 2.85c; Nos. 25-26, 3.05c; Nos. 27, 3.25c; No. 28, 3.45c; No. 29, 3.70c; No. 30, 3.95c. Quotations f. o. b. Pittsburg, 30 days net, 2 percent off cash 10 days.

Wire and Wire Nails.—Business has been comparatively slack since the latest advance of $1 a ton, large buyers having covered for moderate tonnages before the advance. We quote regular prices now as follows:

Wire nails, jobbers' carload lots, $1.80; retailers' carload lots, $1.85, and less than carloads, $1.95; painted barb wire, $1.95 for jobbers in carloads; retailers' carloads, $2.00, and less than carloads, $2.10, with 30c for galvanizing. Annealed smooth fence wire is held at $1.65, with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o. b. Pittsburg, 60 days, with 2 percent discount for cash in 10 days. Iron and steel cut nails, $1.70 to $1.75.

Merchant Steel.—There is no change in the market, demand remaining fairly good. We continue to quote prices as follows:

Cold rolled and ground shafting, 50 percent off in carload lots, and 45 off in less than carloads, delivered in base territory; tire steel, 1.0c; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flat, 1.50c to 1.55c; smooth finished machinery steel, 1.70c to 1.75c; toe calk, 2c to 2.05c.

Pipes and Tubes.—A large tonnage continues to be booked in merchant pipe, nearly all going to the leading interest, as the leading independent mills became filled up two or three weeks ago as to all the tonnage they cared to take for the present. The market is well represented by the new official prices noted a week ago as having been promulgated Oct. 2. Some good contracts for line pipe have been taken by the independents and the leading interest, and further line pipe business is pending. Line pipe shows an advance of between $1 and $2 a ton from the low point scored a few weeks ago. All oil country goods are higher, some to the extent of about $5 a ton. We quote official prices as follows, in consumers' carloads, concessions to large buyers being on the same basis as formerly:

	Steel		Iron	
Consumers' Carloads	Black	Galv.	Black	Galv.
⅛ and ¼ inch	71	55	68½	52½
⅜ and ½ inch	75	63	72½	60½
¾ to 6 inches	79	69	77	67
7 to 12 inches	74	59	72	56½
EXTRA STRONG PLAIN ENDS.				
⅛ to ⅜ inch	64	52	61½	49½
½ to 4 inches	71	59	68½	56½
4½ to 8 inches	67	55	64½	52½
Double extra strong plain ends, ¼ to 8 inches	60	49	57½	46½

MERCHANT BOILER TUBES, CARLOADS, 22 FEET AND UNDER.

	Steel	Iron
1 to 1½ inches	44	41
1¾ to 2¼ inches	56	41
2½ inches	58	46
2¾ to 3 inches	64	53
6 to 13 inches	56	41

Less than carloads, two points less.

Old Material.—A consumer not far from the Pittsburg district proper came into the market within the week for about 4,000 tons of heavy melting scrap for immediate delivery, being short for the present, although with a good tonnage coming in the future, and had to pay about $16.50, delivered. This cleaned up the market quite well on this grade, and prices are higher, the market being generally quoted at $16.50, although some lots might come out at 25 cents less. Local consumers are not making firm offers beyond about $15.75, which is, of course, out of the question. While there has been some question about whether the dealers would be able to make their point this winter and dispose of their accumulations at good advances, the ex-

perience noted above shows the sensitiveness of the market and the small amount of scrap available at present prices, so that the evidence is in their favor. We revise prices slightly as follows:

Heavy melting stock, $16.25 to $16.50; low phosphorus scrap, $19.50 to $20.50; rerolling rails, $16.00; cast scrap, $14.75 to $15.25; borings, $9.75 to $10; No. 1 wrought, $16.50 to $17.

Coke.—The coke market is still firmer and furnaces which have not already contracted for next year, there being a large interest still uncovered, can see no relief from paying the advanced prices now asked, which are a trifle higher in the week. Some large contracts have recently been made at $2.50 for standard Connellsville furnace coke for next year, and the market is now quoted at $2.60, with $2.60 to $2.75 ruling on prompt furnace coke. Standard Connellsville 72-hour foundry coke is $3 as an absolute minimum, some producers quoting on up to $3.50. Outside grades of coke are held at various figures below standard Connellsville, but are relatively very firm. In the week ending Sept. 30 production in the old Connellsville region is estimated at 271,034 tons, an increase of 4,028 tons, and in the lower Connellsville region at 88,877 tons. Shipments from the old Connellsville region in the week are given at 13,254 cars.

CHICAGO.

Producers Holding Market in Check—Surface Conditions Quiet—Moderate Advances.

OFFICE OF *The Iron Trade Review*,
1161 MONADNOCK BLOCK, October 11.

While surface conditions in the iron and steel trade are quieter than a few weeks ago, there is beneath the seeming calm a keen watchfulness of every move made. The efforts of a number of producers to hold the market in check seem to be ending successfully, and the fear of greatly advanced prices has for a time been removed. Though a tremendous amount of metal has changed hands since Sept. 1, any effort to force the market unduly might lead to disastrous results to buyer and seller in the condition the market is today. The experience of 1903, when the fall in prices and business depression was very great, is still fresh in the minds of producers, and the conservative element is striving seriously to hold prices down to a fair level. Towards this end, several furnaces which had retired from the market re-entered last week long enough to take care of a number of old customers who had failed to cover at the proper time for their requirements. Among these was the International Harvester Co., which bought in the neighborhood of 50,000 tons. The market is now strong at $13, Birmingham, for No. 2 foundry, and there is every indication that an advance of 50 cents a ton will go into effect before the end of the week. In finished materials no appreciable change is evident. The reduction in the price of pipe announced Oct. 2, was a half-way measure intended to meet a condition already existing, rather than an attempt to create a new basis. For some months, discounts of 80 and 81 percent have been made by all producers, and these are still offered. Plates and steel bars continue to sell at the old prices, the advances talked of a week ago not having taken place. There is a good demand for both products, mills being hard pressed to keep pace with the wants of their customers. The Illinois Steel Co. has advanced 12-lb., 16-lb., 20-lb. and 25-lb rails $1 a ton, and 30-lb. to 45-lb. rails 50 cents a ton. It has also advanced spikes $1 a ton. There is an excellent demand for all these materials, shipments being made to points heretofore inaccessible because of high freight rates. Contracts for standard rails, aggregating 35,000 tons, were closed last week by the leading interest, part of the tonnage going to the South Chicago mill and the balance to Eastern plants. There is a good inquiry for forging billets, the local product being strong at $32 to $35. Sheets show no gain in strength and can be bought on the basis of $2.20, Pittsburg, for No. 28 gauge. A feature of the local market that is causing some uneasiness is the coke situation. Only a small proportion of the Western trade has covered for requirements in this material, the balance having to depend on the daily supply for protection. Prices have advanced sharply, and standard Connellsville grades are now selling at $5.90 Chicago.

Pig Iron.—Trading in pig iron continues very brisk. The transactions last week are estimated to exceed 100,000 tons. Several large buyers of both malleable and foundry irons covered for their requirements as far ahead as July next in this period. The International Harvester Co. bought 50,000 tons, of which 20,000 tons was placed with the Sloss-Sheffield Steel & Iron Co. at about $12.75, Birmingham, for No. 2, 7,500 tons with the Virginia Coal, Iron & Coke Co. at $14, furnace, and the balance with Northern furnaces controlled by Rogers, Brown & Co. Their deliveries extend through the first half of the year. Several producers which had announced their retirement from the market some weeks ago re-entered to participate in this tonnage. It is not known at what price the Harvester order was closed, but it is understood the other offerings were accepted at $12.50, Birmingham, for No. 2 foundry, in the case of Southern irons, and from $17 to $17.50, Chicago, for the same grade of Northern irons. Since that time, the Birmingham product has advanced to $13, and the absolute minimum of lake irons to $17.50. All the leading Birmingham and local producers are now out of the market, which leaves the Virginia furnaces and a few isolated Alabama stacks the only source of supply for Southern irons. The Virginia interests are asking $17.15, Chicago for No. 2 foundry, or $14.50, furnace. Malleable iron has advanced 50 cents a ton and is selling at $17.50, Chicago. We have revised our prices, and quote as follows:

Lake Superior charcoal	$ 18.00
Northern Foundry No. 1	18.00
Northern Foundry No. 2	17.50
Northern Foundry No. 3	17.00
Northern Scotch Foundry	18.00
Ohio Strong Softeners No. 1	17.30 to 17.80
Ohio Strong Softeners No. 2	16.80 to 17.30
Southern Foundry No. 1	16.65 to 17.15
Southern Foundry No. 2	16.15 to 16.65
Southern Foundry No. 3	15.65 to 17.15
Southern Foundry No. 4	15.40 to 15.90
Southern No. 1 Soft	16.65 to 17.15
Southern No. 2 Soft	16.15 to 16.65
Southern Gray Forge	14.90 to 15.15
Southern Mottled	14.65 to 14.90
Southern Silveries (4 percent to 6 percent Silicon)	17.65 to 18.15
Jackson Co. Silveries (8 percent to 10 percent Silicon)	19.80 to 20.80
Alabama and Georgia Car Wheel	20.65
Malleable Bessemer	17.50
Basic Iron	16.65 to 17.15

Billets.—Forging billets continue in excellent demand. Local makers are holding their product from $32 to $37, according to the tonnage demanded.

Bars.—There were large purchases of bar iron last week by car builders, one local interest contracting for a round tonnage. Inquiry for iron is very heavy, mills being hard pressed to make satisfactory deliveries. Since the steel mills became tightly filled up, agricultural implement manufacturers have bought freely of iron, cheerfully paying the higher cost for same. There is nothing of importance to report with regard to steel bars. Prices are unchanged, and specifications continue to flow in unprecedented volume. We quote carload lots, mill shipments, Chicago delivery, soft steel bars and bands, 1.66½c, half extras; soft steel angles, less than 3 x 3, 1.76½c; hoops, 1.91½c base, full extras. Hard steel angles, 1.60c to 1.65c. Demand from store is heavy and prices are firm. We quote bar iron, 1.95c to 2c base, full extras; soft steel bars and bands, 1.85c base, half extras; soft steel angles, channels and tees, under 3 in., 1.95c; hoops, 2.20c to 2.30c base, full extras.

Sheets.—Despite the efforts to rejuvenate the market and make prices stronger, sheets continue to lag behind all other products. The demand is good for both black and galvanized.

and is especially heavy for electrical and other special sheets The situation ought to have been strengthened by the withdrawal of some independent interests by the rising cost of raw materials, a couple of weeks ago, but no signs of this are apparent as yet. It is still possible to buy black sheets on the basis of $2.20, Pittsburg, for No. 28 gauge, and galvanized $1 higher. With this reservation, we quote what is generally considered the market price for carload lots. For mill shipments, Chicago delivery, blue annealed sheets, Nos. 9 and 10, 1.81½c; Nos. 11 and 12, 1.86½c; Nos. 13 and 14, 1.91½c; Nos. 15 and 16, 2.01½c. On box annealed, one pass, cold rolled, we quote: Nos. 18 and 20, 2.21½c; Nos. 22 and 24, 2.26½c; Nos. 25 and 26, 2.31½c; No. 27, 2.36½c; No. 28, 2.46½c; No. 29, 2.56½c. We quote on lots from warehouse stocks, as follows: No. 10, 2.15c to 2.20c; No. 12, 2.20c to 2.25c; No. 14, 2.25c to 2.30c; No. 16, 2.35c to 2.40c; Nos. 18 and 20, 2.50c to 2.55c; Nos. 22 and 24, 2.55c to 2.60c; No. 26, 2.60c to 2.70c; No. 27, 2.75c to 2.80c; No. 28, 2.85c to 2.90c; No. 29, 3c to 3.05c. Galvanized sheets, mill shipments, Chicago delivery, are quoted as follows: Nos. 12 and 14, 2.41½c; No. 16, 2.56½c; Nos. 18 and 20, 2.71½c; Nos. 22 and 24, 2.86½c; No. 26, 3.06½c; No. 27, 3.26½c; No. 28, 3.46½c; No. 29, 3.71½c. Jobbers' prices on small lots from store are as follows: Nos. 10 to 14, inclusive, 3.10c; No. 16, 3c; Nos. 18 and 20, 3.10c; Nos. 22 and 24, 3.25c; No. 26, 3.50c; No. 27, 3.70c; No. 28, 3.95c; No. 29, 4.40c; No. 30, 4.85c.

Structural Steel.—No change is noted in the local situation. Specifications are heavy, but deliveries from mills are slow. Local jobbers and contractors are able to replenish their stocks only by scouring the country for the sizes needed. Prices are very firm. We quote carload lots, mill shipments, Chicago delivery, as follows: Beams and channels, 3 to 15 in., inclusive, 1.86½c; angles, 3 to 6 in., ¼ in. and heavier, 1.86½c; angles larger than 6 in. on one or both legs, 1.96½c; beams larger than 15 in., 1.96½c; zees, 3 in. and over, 1.86½c; tees, 3 in. and over, 1.91½c; with the usual extras for cutting to exact lengths, punching, coping, bending or other shop work. We quote prices from store as follows: Angles, 2.25c to 2.35c; beams and channels, base sizes, 2.25c to 2.75c; tees and zees, 2.30c to 2.35c. These prices are for either random lengths or cut to specifications in excess of 5 ft.

Plates.—In anticipation of an advance being announced in the near future, no quotation is left open longer than 48 hours. Mills are very firm in their attitude toward buyers. Except in isolated cases, prompt delivery is hard to obtain. The demand is very heavy and general. We quote carload lots, Chicago delivery, mill shipments, as follows: Tank steel, ¼ in. and heavier, up to 100 in. wide, 1.76½c base; flange steel, 1.86½c base; marine steel, 1.96½c base, all full extras. Plates, 3-16 in. thick, $2 extra; gauges 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. Jobbers report a good movement from local stocks with store prices firm. We quote on small lots as follows: Tank steel, ¼ in. and heavier, up to and including 72 in. wide, 2c to 2.10c; over 72 in. wide up to 100 in., 2.10c to 2.20c; over 100 in. wide, usual mill extras, 3-16 in. up to but not including 72 in. wide, 2.10c; 3-16 in., 72 in. wide 2.35c; flange steel, 25c extra; heads, 25c extra.

Rails and Track Supplies.—Light rails were advanced by the local maker last week, 12-lb. to 25-lb. sections taking $1 a ton, and 30-lb. to 45-lb. sections, 50 cents a ton. Spikes were also moved up $1. The demand for these products has been very heavy, shipments being made as far west as the Pacific Coast. Contracting for standard sections was light last week, comparatively speaking, 35,000 tons being the aggregate business in this product. We have revised our prices, and quote heavy sections in 500-ton lots, f. o. b. mill, $28; less than 500 tons to carload lots, $30; less than carload lots, $32. Light rails, f. o. b. Milwaukee mill: 12-lb. sections, $30; 16-lb., $29; 20-lb., $28; 25-lb., $27; 30, 35, 40 and 45-lb. sections, $25.50. Track supplies, f. o. b. Joliet, are as follows: Angle bars, 1.50c to 1.75c, according to tonnage; spikes, first quality, 1.85c to 1.95c; track bolts, 3¼ x ¾, with square nuts, 2.40c to 2.50c per lb., with hexagon nuts, 2.55c to 2.65c.

Merchant Steel.—The leading makers continue out of the market, and new business is of light volume. This condition has deflected a large tonnage to jobbers who are getting fancy premiums for quick deliveries. Mill specifications are heavy. Prices are without change, and we quote carload lots, mill shipments, Chicago delivery, as follows:

Spring steel, 2.10c; sleigh shoe, flat sizes, 1.71½c; concave and convex, 1.86½c; cutter shoe, 2.35c to 2.40c; smooth finished machinery steel, 1.91½c; smooth finished tire, 1.86½c; plow steel, 2.20c and upward, according to quality; toe calk steel, 2.21½c; railway spring, 1.86½c. Cold rolled shafting, 52½ percent off to dealers, 50 percent off in carload lots, and 45 percent in less than carload lots. Crucible tool steel, 6½c to 8c; special grades of tool steel, 13c and up.

Cast Iron Pipe.—The only municipal contract under consideration this week is the Portland (Ore.) inquiry for 3,700 tons, which will be let on the 11th. Routine business is good. Prices are firm. We quote carload lots, f. o. b. Chicago, 4-in. water pipe, $30; 6, 8, 10 and 12-in., $29; larger sizes, $28.50; gas pipe, $1 extra.

Merchant Pipe.—The new prices which went into effect Oct. 2 have not changed the local situation. The increase in discounts only partially met the prices that are made in this market, which are as high as 81 percent from list. There is still a gap of two or three points between "official" and selling prices. The market, however, has gained strength by the change, and with a good tonnage coming forward weekly, it is expected sentiment will improve and prices stiffen. Basing prices are given in our Pittsburg report; Chicago values can be obtained by adding 1.65c for freight rate.

Boiler Tubes.—This product continues in healthy demand. Local jobbers report their sales are heavy and that they are having difficulty to replenish their stocks. Mill shipments are slow, some interests being several weeks behind. Prices are without change. We quote carload lots, Chicago delivery, as follows:

BOILER TUBES.

	Steel.	Iron.	Seamless.
1 to 1½ inches	40.35	37.35	53.00
1¾ to 2¼ inches	54.35	39.35	40.00
2½ inches	56.35	44.35	43.00
2¾ to 5 inches	62.35	51.35	
		Up to 4½ inches	50.50
6 to 13 inches	92.35	37.35	

Less than carload lots from store, as follows:

	Steel.	Iron.	Seamless Steel.
1 to 1½ inches, inclusive	40	35	42½
1¾ to 2¼ inches, inclusive	50	35	35
2½ inches, inclusive	52½	35	30
2¾ to 5 inches, inclusive	60	47½	42½

Wire Products.—The advance of a week ago has been well sustained. New business is of good volume. Specifications for wire nails are especially heavy. We quote carload lots, mill shipments, Chicago delivery, as follows: Wire nails, $2; painted barb wire, $2.15; galvanized barb wire, $2.45; smooth annealed wire, $1.85; smooth galvanized wire, $2.15; polished staples, $2.10; galvanized staples, $2.40.

Coke.—There is a strong demand for coke from consuming interests in this section. A great many failed to cover when prices were low and deliveries sure, and are now seeking to contract for their requirements. The haste of these to protect themselves, coupled with the shortage of cars and the scarcity of labor at ovens, has caused prices to rapidly advance. Standard 72-hour grades of Connells-

ville coke are quoted at $3.25 ovens, or $5.90 Chicago. Only a small quantity of Wise County coke is coming into this market, and for this dealers have no trouble in getting from $5.65 to $5.90 for same.

Old Material.—Though nearly 10,000 tons of scrap have been sold by Western railroads to local dealers within the last few days, there are no signs of any weakness or falling off in activity as a result. In some products, notably iron rails, dealers' forge and wrought pipe, prices have advanced 50 cents a ton; other materials are without change. The three leading lists comprising the above tonnage are those of the Rock Island for 2,000 tons, Santa Fe, 3,000 tons, and C., M. & St. P. for 1,800 tons. The consumptive demand for scrap is increasing, several mills and foundries having been caught short. We have revised our prices, and quote gross tons as follows:

Old steel rails (4 feet and over)	$15.50 to 16.00
Old steel rails (less than 4 feet)	15.00 to 15.50
Old iron rails	22.00 to 22.50
Relaying rails, subject to inspection	26.00 to 27.00
Heavy melting steel	15.00 to 15.50
Mixed country steel	12.50 to 13.00

We quote as follows net tons:

No. 1 R. R. wrought	17.00 to 17.50
No. 2 R. R. wrought	16.00 to 16.50
Shafting	17.50 to 18.00
Dealers' forge, No. 1	14.00 to 14.50
Wrought pipe and flues	12.00 to 12.50
No. 1 cast, 150 lb. and less	13.50 to 14.00
No. 1 mill	9.00 to 9.50
No. 1 Busheling	12.00 to 12.50
No. 2 Busheling	11.50 to 12.00
Country sheet	8.00 to 8.50
No. 1 boilers cut	11.50 to 12.00
Boiler punchings	14.00 to 14.50
Iron car axles	23.50 to 24.00
Steel car axles	18.00 to 18.50
Iron axle turnings	11.50 to 12.00
Cast borings	9.00 to 9.50
Mixed borings, etc	9.00 to 9.50
Machine shop turnings	11.00 to 11.55
Railroad malleable	13.75 to 14.25
Agricultural malleable	13.25 to 13.75
Stove plate and light cast scrap	11.25 to 11.70
Old iron splice bars	18.50 to 19.00

CLEVELAND.

Ore Shipments Not as Large as Estimated—Pig Iron Prices Advancing.

OFFICE OF *The Iron Trade Review*,
BROWNING BUILDING, October 11.

Iron Ore.—The shipments from upper lake ports for September were 4,425,550 tons, against 4,006,442 tons in September, 1904. The shipments by ports for the month and for the season to Oct. 1 were as follows:

	Sept., 1904.	Sept., 1905.
Escanaba	594,338	697,490
Marquette	360,034	377,623
Ashland	463,762	437,843
Superior	766,557	698,752
Duluth	892,087	1,197,887
Two Harbors	929,664	1,015,955
	4,006,442	4,425,550
1905 Increase		419,108

	To Oct. 1, 1904.	To Oct. 1, 1905.
Escanaba	2,292,646	3,925,355
Gladstone	480	.....
Marquette	1,177,044	2,259,834
Ashland	1,431,731	2,586,194
Superior	2,683,034	3,866,778
Duluth	3,041,006	6,787,378
Two Harbors	2,995,497	6,043,067
	13,622,438	25,475,608
1905 Increase		11,851,168

If the shipments for the season after Oct. 1 should be the same this year as last, the total for the entire season of 1905 would be 33,079,771. The total for the season to Oct. 1 is greater than the shipments for any entire season except that of 1902. Shipments are now being delayed on account of car shortage.

Pig Iron.—The disposition of furnaces to discourage buying for next year is growing more pronounced. Some furnaces have announced their withdrawal while others have advanced quotations so high that few sales can be made. Consumers in Cleveland are now finding it difficult to buy foundry iron for any delivery at $16 for No. 2, although iron ore recently shipped from the Valley and sold in this city at $16, the freight rate making the price at the furnace $15.15. The Valley price now ranges from $15.50 to $16 for No. 2 foundry, with basic and Bessemer quoted at $15.50. Coke prices are advancing, the usual contract price for Connellsville furnace coke being $2.65, while some contracts have been made at a higher figure.

Southern pig iron producers have made very heavy rates during the past three months and the price is now very near $13, Birmingham, for No. 2. We quote as follows, Cleveland delivery:

Bessemer	$16.10 to 16.35
No. 1 Foundry	17.00 to 17.50
No. 2 Foundry	16.00 to 16.85
No. 3 Foundry	15.00 to 15.50
No. 2 Southern	16.35 to 16.85
Gray Forge	15.25 to 15.35
Gray Forge, Southern	14.75 to 15.00
Lake Superior charcoal	17.00 to 17.50

Finished Material.—Jobbers have seldom, if ever, enjoyed such heavy business as at present. Office forces are being severely taxed and it is difficult to obtain cars fast enough to ship material as ordered. The bar iron market is firm at 1.70c, and Cleveland mills can take no more orders for this year. Locomotive and car building companies are specifying heavily. There is also good demand for steel bars at 1.50c, Pittsburg, but it is not expected that there will be an advance soon. A few mills are able to give reasonably prompt delivery on plates, but they are located at a considerable distance from Cleveland. Buyers of structural material find that companies which are not demanding premiums will not promise delivery in less than four to six months. In cases where prompt delivery is necessary, large premiums are being paid. There is considerable buying of shapes for next year. Tinplate is not strong and the cutting in prices of sheets is still in evidence, although the demand for sheets is good. The cutting of sheet prices is now attributed to competition of jobbers more than to activity of independents.

Old Material.—The local market has been somewhat less active the past week owing to the fact that consumers had bought heavily and were well covered. The demand, however, continues good with prices practically unchanged. We quote Cleveland delivery as follows:

Old iron rails	$22.50 to 23.50
Old steel rails (over 6 feet)	15.50 to 16.50
Old steel rails (under 6 feet)	16.50 to 17.50
Old car wheels	15.50 to 16.00
Steel boiler plate	13.50 to 14.50
Steel axles	18.00 to 19.00
Malleable iron (railroad)	15.50 to 16.50
Malleable iron (agricultural)	14.50 to 15.50
Heavy steel	16.50 to 16.75

We quote as follows, net tons:

No. 1 R. R. wrought	16.50 to 17.00
No. 1 busheling	14.00 to 15.00
No. 1 machine cast	13.75 to 14.25
Iron axles	22.00 to 23.00
Axle turnings	11.50 to 12.50
Wrought turnings (free from cast)	11.00 to 12.00
Grate bars	8.50 to 9.50
Pipes and flues	12.50 to 13.50
Tank iron	10.00 to 10.50
Hoop and band iron	8.00 to 9.00
Sheet iron	7.00 to 8.00
Wrought drillings	11.00 to 12.00
Stove plate	10.00 to 10.50
Cast borings	8.50 to 9.50

New Plant at Lorain.—The National Tube Co. is preparing plans for a bloom and ingot mold foundry at Lorain, O., to cost about $500,000. The foundry will supply ingot molds to various plants of the company which is now purchasing many of them from outside concerns. The new plant, it is said, will be the largest of its kind in the world.

CINCINNATI.

Ore Producer Sells 40,000 Tons and Withdraws—Market Quiet, But Prices Firm.

October 11

Pig Iron.—The buying of the past week has been smaller than in the preceding one, and the market is quieting down after the heavy rush of business recently booked. The most notable transaction was the purchase of large agricultural implement makers in Chicago territory. It is reported that this interest took 7,500 tons of Virginia iron by analysis at $14, Virginia furnace, for delivery in the first half of 1906, in addition to other iron purchased. One of the leading Southern producers reports sales of 50,000 tons during the week and has withdrawn from the market. Some Southern furnace interests have marked their prices up to $13, Birmingham basis, but no sales at this price are reported. The Southern pig iron market is regarded as firm at $12.50 for No. 2 foundry for first quarter of next year delivery, and sales during the week were mainly at this figure. Ohio furnaces are apparently governed in their quotations by special circumstances surrounding each individual transaction. The kind of iron wanted, the condition of order books and the supply of certain grades which the furnace may have all enter into price making. Under such conditions there is a wide range in quotations and the figures range from $15 to $16 for No. 2 at furnace. A strong tone prevails all along the line, however, and the tendency of prices is upward. High silicon iron is stronger and has been in moderately good demand. The buying has been mainly confined to small lots ranging from 100 to 500 tons for first quarter and first half of next year delivery. The sales agencies representing Southern furnace interests freely express the belief that before the close of the week the market will be firmly establishd at $13 Birmingham basis, as the temper and disposition of Southern furnaces is to advance prices. As the situation stands one of the largest producers is out of the market with instructions to submit all business before contracting. Another large interest has nothing to offer. A number of the smaller producers are pretty well sold up on the high grades, and a careful survey of the situation shows that there are remaining only a few of the Southern producers still quoting $12.50 Birmingham although one of these is an important factor and a large producer.

We quote f. o. b. Cincinnati as follows:

Southern Foundry No. 1	$15.75 to 16.25
Southern Foundry No. 2	15.25 to 15.75
Southern Foundry No. 3	14.75 to 15.25
Southern Foundry No. 4	14.25 to 14.75
Southern Foundry No. 1, soft	15.75 to 16.25
Southern Foundry No. 2, soft	15.25 to 15.75
Gray Forge	13.50 to 13.75
Northern Foundry No. 1	16.65 to 17.15
Northern Foundry No. 2	16.15 to 16.65
Northern Foundry No. 3	15.65 to 16.15
Jackson County Silvery, 8 percent	18.65 to 19.15
Southern Charcoal	18.75 to 19.25

Finished Material.—The demand continues active, and the market strong. It is intimated that an advance in plates is probable in the near future. Bar iron is firm at the recently advanced quotation. Structural shapes are still in good demand with deliveries difficult to obtain. Bar iron is quoted at 1.70c to 1.75c; steel cars at 1.63c, half extras, with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets, No. 10 and No. 12, in car lots are 2.48c. We quote black sheets, No. 27, at 2.30c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. 27, 2.60c; No. 16, 2.20c; No. 14, 2.10c; No. 12, 2.05c; No. 12 2c. Tank plates are firm and sell out of store at 2c for ¼-in. and 2.10c for 3-16, Nos. 8 and 10. Beams and channels are quoted at 2.25c to 2.50c from stock and angles at 2c to 2.05c for base sizes.

In merchant pipe the market is steadier, as the recent revision of prices by the leading interests, conforms more nearly to the actual market. It is understood that some of the independent mills are withdrawing from the market, having booked heavily. We revise quotations to conform to the recent changes in discounts. We quote f. o. b. Cincinnati as follows:

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛ and ¼ inches	60.7	50.7	67.2	51.2
⅜ and ½ inches	73.7	61.7	71.2	59.2
¾ to 6 inches	77.7	67.7	75.7	65.7
7 to 12 inches	72.7	57.7	70.7	55.2

Coke.—There is a continued good demand and prices are higher in nearly all producing districts. It is becoming increasingly difficult to obtain quotations from producing interests on contract coke. Prices are exceedingly irregular and quotations are making frequent changes, low quotations being superceded by higher figures. Prices in the various coke-producing districts are as follows f. o. b. ovens:

†Wise County, Va. Furnace Coke prompt shipment	$2.40 to 2.50 per ton
Wise County, Va. Foundry Coke on contracts	2.75 to 3.00 per ton
Pocahontas Furnace Coke on contracts	2.60 to 2.75 per ton
Pocahontas Foundry Coke on contracts	2.90 to 3.00 per ton
*Connellsville Furnace Coke on contracts	2.60 to 2.80 per ton
*Connellsville Foundry Coke on contracts	3.00 to 3.25 per ton
Kanawha Furnace Coke on contracts	2.10 to 2.25 per ton
Kanawha Foundry Coke on contracts	2.35 to 2.50 per ton

†Wise County, Va., Coke on Furnace contracts is sold mainly on a sliding scale basis for pig iron prices on the following basis: $1.65 per ton on $9.00 pig iron, plus 17 percent of the advance on pig iron above $9.00 Birmingham.

*Connellsville Coke inside prices apply to "main line" ovens and not to strictly Connellsville Coke.

Old Material.—The market is firm and fairly active with prices showing an upward tendency. We quote f. o. b. Cincinnati:

Old No. 1 railroad wrought, net tons	$16.50 to 17.00
Cast machine and foundry, net tons	13.50 to 14.00
Old iron rails, gross tons	22.00 to 23.00
Old steel rails, gross tons	16.00 to 16.50
Old short lengths, gross tons	17.00 to 17.50
Old iron axles, net tons	22.00 to 23.00
Stove plate, net tons	10.00 to 10.50
Wrought turnings, net tons	11.00 to 12.00
Cast borings, net tons	8.50 to 9.00
Car wheels, net tons	16.00 to 16.50

PHILADELPHIA.

Strong Demand for Pig Iron, But Producers Discourage Buying.

October 11.

The demand for pig iron continues very large, but two causes have contributed to abate somewhat the furious rush of the preceding month. One is the attitude of many producers, who are doing everything in their power to discourage buying that seems inclined to become speculative, and the other is the fact that many large consumers, having placed their orders for the remainder of 1905, and some for the first quarter of 1906, are for the time out of the market and are acting in sympathy with the furnace men in their efforts to head off a runaway market. The outlook is still for higher prices, but if these conservative influences prevail the advance will come gradually instead of by bounds. There is a natural anxiety among furnace men to know just what they must pay for coke and iron ore in 1906 before they fill up their books with orders for the first half of next year. For the present, therefore, some have practically withdrawn from the market, and only give quotations to old customers who cannot well be refused.

Pig Iron.—Prices are higher than they were last week, and the range is at times unusually wide owing to the varying conditions at the furnaces. The advance has been from 25 to 50 cents a ton in most grades. Basic and foundry irons have been especially active, and the orders show only a slight diminution in their impressive volume.

While prices are liable to show marked changes any day the following may be taken as to-day's quotations:

No. 1X Foundry	$17.50 to 18.25
No. 2X Foundry	17.00 to 17.75
No. 2 Plain	16.50 to 17.25
Standard Gray Forge	15.25 to 15.75
Ordinary Gray Forge	15.00 to 15.25
Basic	16.75 to 17.25
Low Phosphorus	21.75 to 22.50
Southern No. 2X, rail	16.50 to 16.75
Southern No. 2X, dock	16.00 to 16.25

Finished Material.—There is little change to be noted. The mills, especially those engaged in the manufacture of structural material, are busy up to their full capacity, and recent announcements by the railroads of their wants in new steel cars, bridge work and other like material show that there is to be no cessation in the pressure for a long time to come. Prices, which are more or less nominal, remain as follows: Beams, channels and angles, according to specifications, 1.83½c to 2.50c; refined iron bars, 1.63½c to 1.80c; steel bars, 1.63½c to 1.83c; plates, 1.73½c to 1.80c.

Old Material.—Some slight concessions in prices have been made by dealers, in order to induce the mills to buy more freely, but the tendency is toward higher prices, especially as speculators have made large purchases of scrap in that belief. Prices may be quoted as follows:

Old steel rails	$16.50 to 17.00
No. 1 steel scrap	16.00 to 16.75
Old steel axles	21.00 to 21.50
Old iron axles	25.00 to 26.00
Old iron rails	21.00 to 22.00
Old car wheels	15.75 to 16.25
Choice scrap, R. R. No. 1 wrought	21.00 to 23.00
No. 1 yard scrap	18.75 to 19.35
Machinery scrap	15.25 to 15.75
Low phosphorus scrap	21.00 to 22.00
Wrought iron pipe	15.75 to 16.25
No. 1 forge fire scrap	15.25 to 15.50
No. 2 forge fire scrap, ordinary	12.50 to 13.00
Wrought turnings	13.75 to 14.25
Axle turnings, heavy	14.75 to 15.25
Cast borings	9.75 to 10.25
Stove plates	12.00 to 12.50

NEW YORK.

Pig Iron Market Strong—Scarcity Limits Sales—Shapes Still Command Premiums.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., October 11.

Pig Iron.—With many producers out of the market and agents marking time by mailing regrets for inability to furnish more material to clamoring customers, the local pig iron situation has been peculiar during the week. Under the circumstances a rapid advance in prices would seem to be in order. Yet Southern iron is still being sold on a basis of $12.50, Birmingham, while other producers in the same district are demanding a dollar more, and Northern furnaces are daily refusing the equivalent of even higher figures. In spite of the inability to consider new business in many quarters, the sales of the week have not been light. Fully 40,000 tons have actually been placed in the local market, some, however, for shipment to interior points. More than half of this total is made up of various grades of foundry iron, mostly in small lots to regular customers. Inquiry for basic has been extremely active, but transactions were inconsiderable, the question at issue being whether consumers would or would not accede to a sharp advance in prices. Pipe founders have also bought considerable tonnages. A moderate quantity of gray forge, several lots of Virginia, and a few orders for Pennsylvania. New Jersey and New York State foundry were also placed. The following are prices at tidewater:

Northern No. 1 Foundry	$17.50 to 18.00
No. 2 Foundry	17.00 to 17.50
No. 2 Plain	16.50 to 17.00
No. 1 Southern Foundry	16.50 to 16.75
No. 2 Southern Foundry	16.25 to 16.50
No. 3 Southern Foundry	15.50 to 15.75
No. 4 Foundry	15.00 to 15.25

Pig Iron Certificates.—The market has been dull but firm. Very few sales were consummated during the week. One 100-ton lot of foundry changed hands last Saturday. Foundry iron warrants follow:

	Bid.	Asked.
October	.....	16.00
November	.....	16.00
December	.....	16.10
February	.....	16.20

Finished Iron and Steel.—The railroads of the country are still the chief support of the steel market. The requirements for rails and structural material for bridges have apparently not all been met as yet. A very large tonnage of rails is reported this week. Among the principal orders were: Northern Pacific railroad, 80,000 tons; Louisiana Railway & Navigation Co., 5,000; Great Northern, 35,000; Minneapolis & St. Louis, 29,000; Ocean Shore railroad, 8,000; Kansas City, Mexico & Orient, 13,000; and a very large total taken by the New York Central railroad, the details of which have not been given out, besides a number of smaller lots making up an aggregate of 25,000 to 30,000 tons more. Business in structural material is returning slowly. A very large amount is still awaiting an opportunity to secure material. The American Bridge Co. reports a very satisfactory amount of business in sight. The most important individual order of the week is one for 16,000 tons of bridge material placed by the A., T. & S. F. R. R. The old trouble of securing shapes still prevails. Eastern plate mills are now better supplied with orders than a few weeks ago, but they are still well able to take care of the new business which appears. The volume of business in bars has been heavy and billets are in good demand. Tin plates are dull and weak with lower prices. The following are prices at tidewater: Angles, 3 to 6 in. x ¼ in. and heavier, 1.84½c; beams, 3 to 15 in., 1.84½c; tees, 3 x ¼ in. and heavier, 1.89½c; plates, carloads, tank, 1.74½c; flange, 1.84½c; marine and ordinary fire box, 1.94½c; refined iron bars, 1.60c; soft steel bars, 1.64½c to 1.79c; sheets in carload lots, New York, No. 28, black, 2.40c.

Old Material.—The market has been stronger both as regards demand and price. Dealers and speculators are anxious to buy at full prices, and the steel scrap of No. 1 description is firmer than last week. The demand for wrought material is also active, and the inquiry for all kinds of cast scrap is increasing. The following prices are f. o. b. approximately, at tidewater:

Old iron rails	$20.00 to 21.00
Old steel rails, long lengths	14.50 to 15.00
Old steel rails, short pieces	14.00 to 14.50
Relaying rails	22.50 to 23.00
Old car wheels	16.00 to 16.50
Old iron car axles	21.00 to 22.00
Old steel car axles	18.50 to 19.00
Heavy melting steel scrap	14.00 to 14.50
No. 1 railroad wrought scrap	18.00 to 19.00
Iron track scrap	17.50 to 18.00
Wrought pipe	12.00 to 13.00
Cast borings	9.50 to 10.00
Wrought turnings	13.50 to 14.00

Elevator Plant Leased.—The Gardner Elevator Co., Detroit, Mich., has secured a ten-year lease of the Howard Iron Works Co., Buffalo, and increased the stock of the latter concern from $50,000 to $200,000. The output of the Buffalo plant will be tripled under the new arrangement. The officers of the combination are H. F. Madden, president; R. W. Gardner, Detroit, vice president; F. S. Porter, secretary; Judge Loran L. Lewis and O. N. and G. H. Porter, of Detroit, directors.

BIRMINGHAM.

More Companies Withdraw and the Market is Strong and Advancing.

BIRMINGHAM, ALA., Oct. 9.—The main feature of the pig iron market conditions in Alabama is the withdrawal of manufacturers from the market, pending the clearing of orders from their books. The demand has been exceptionally heavy during the past four weeks. Last week large amounts of iron were sold by the producers in this section and almost every company is out of the market entirely or handling business very cautiously. The Alabama Consolidated Coal & Iron Co. had to withdraw a week ago in order to ascertain exactly where it is, having orders on hand for a large volume of business. Thursday the Sloss-Sheffield Steel & Iron Co. booked orders for iron aggregating something like 50,000 tons, and immediately thereafter announced that it had withdrawn from the market. The statement was authorized the first of the past week that its sales in September aggregated 115,000 tons and in three months the product of eight months has been sold. This will take up the greater portion of the make by this company until April or May of the coming year. The Lacey-Buck, Tennesee Coal, Iron & Railroad Co., the Woodward and the Tutweiler companies were also reported as well sold up the last part of the week just past.

Pig iron quotations in the Birmingham district have advanced in the last few days 50 cents per ton. The last $12.50 per ton, No. 2, foundry iron, was sold the middle of the past week. Some of the companies in this district threw out an intimation of $13 per ton iron early last week, and already some sales have been made at the new price.

The following quotations are given now: No. 1, foundry, $13.50; No. 2, foundry, $13; No. 3, foundry, $12.50; No. 4, foundry, $11.50; gray forge, $11; No. 1, soft, $13.50; No. 2, soft, $13.

There is a lively inquiry for iron even at the high prices and such companies as can accept business are finding no trouble in selling the product. The statement is given out with authority that at least four-fifths of the probable make for the balance of the year and three-fourths of the probable make for the first quarter in next year have been sold ahead.

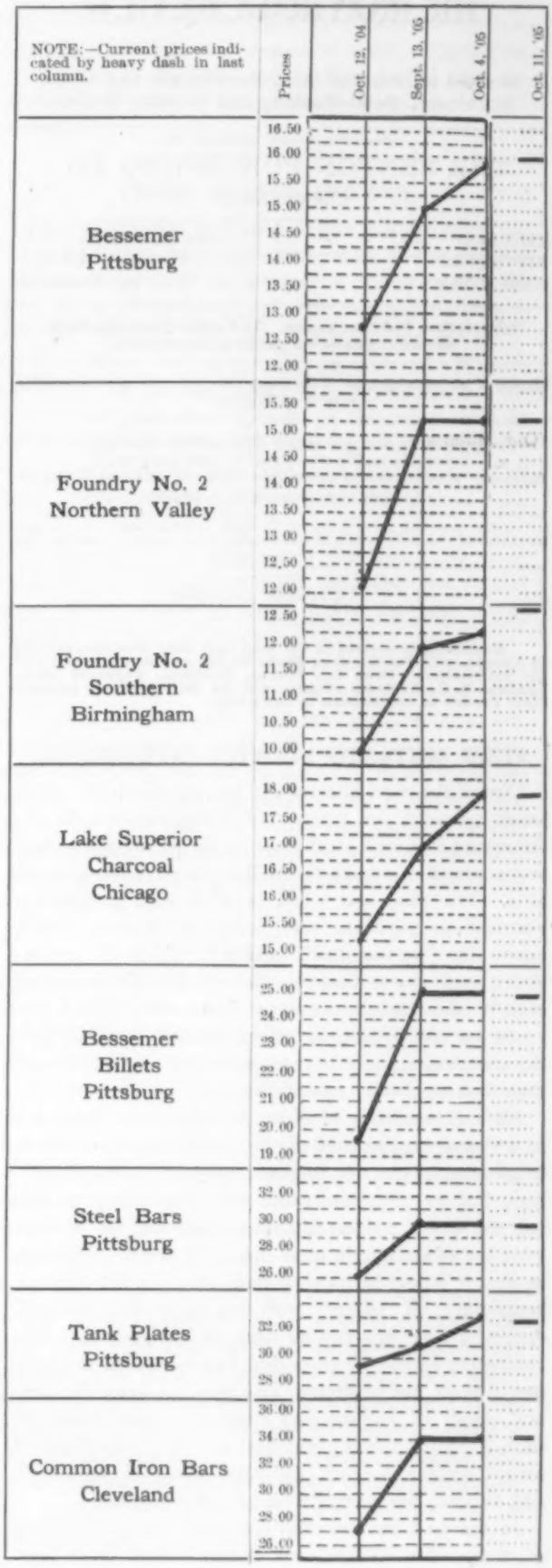
The Birmingham rolling mill (Republic Iron & Steel Co.) has resumed operation after many months' idleness. The puddling department went on first and it will be followed by other departments. A large percent of the old employes of the plant are being given employment again. J. H. Pritchard is superintendent, and it is stated that there is a large amount of business in hand or in sight to keep the plant in operation for some months. The Republic company also has its Gate City rolling mills, near here, in operation.

The steel, cast iron pipe, foundry and machine shop trade in the Birmingham district shows no change, great activity being noted on all sides. The consumption of metal right in the district is exceedingly heavy with the brightest of prospects for some time to come.

The frog and crossing plant at North Birmingham is nearing completion. The drop forge plant at North Birmingham is in operation. The Anniston Foundry & Machine Works is being enlarged. A fitting department is being added.

Lake Superior Mining Institute.—For the annual meeting of the Lake Superior Mining Institute, Oct. 17-19, the Duluth, South Shore & Atlantic, the Chicago & Northwestern and the Chicago, Milwaukee & St. Paul, have made a fare and a third for the round trip, on the certificate plan. The South Shore road reaches no nearer Iron Mountain than Champion, but its sleepers will be set out there and the members taken on later over the St. Paul line to Iron Mountain. The meeting place is most inconvenient for members from the western part of the Lake Superior region.

PRICE CHART.



THE IRON TRADE REVIEW

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Americans interested in the iron and steel business, visiting in Europe, will find The Iron Trade Review on sale at the office of the International News Co., Breams Buildings, Chancery Lane, London, E. C., England. Copies will be forwarded on request, from London to any address in the world.

STEEL CONTRACTS STRICTLY INTERPRETED.

One of the most interesting changes which has lately taken place in the manner of doing business in the American iron and steel trade is the much more rigid enforcement of contracts for the sale of finished products. The time was when in most such products a contract to purchase was really an option. Later came the "jug-handled" contract, which in its entirety was worse than a contract for the purchase merely of a definite tonnage, from which the buyer could recede, because it was construed so as to give the purchaser, in many cases, much more material than was originally contemplated.

All such methods of doing business have been due to a desire on the part of the manufacturers to book large tonnages at the expense, generally, of competitors, but as competitors did the same thing no one but the buyer gained an advantage, and he in turn gave his advantage in most instances to his customers, so that it would be hard to find who was the ultimate beneficiary, if indeed such an individual existed. Again, it was regarded as more or less necessary that customers should be protected, but where all are protected none are protected, and this has been the general result of jug-handled contracts, each holder of such a contract being exposed to the competition of others holding similar contracts, when, if none such had existed, the market would have advanced.

In the past few months contracts for the delivery of a specified quantity of finished steel have been more rigorously interpreted than ever before. With the general level of values constantly advancing, and a demand for all the crude steel that could be turned out, whether converted into one finished form or another, manufacturers have insisted that where a given tonnage of material has been purchased, for delivery or specification within a definite period, all obligation has been discharged when the letter of the contract has been complied with.

The benefits of this new spirit in the steel trade have been important and far-reaching. Manufacturers have received, sooner than ever before, the tangible fruits of advancing values, in higher prices for the tonnage actually delivered month by month. The danger of disaster has been minimized from a decline in prices, because such a decline would not find a large tonnage of contracts on which deliveries could not be enforced. Furthermore, buyers have been constrained to specify promptly against their contracts, so that mills have been better able to foresee the demands upon them and lay plans ahead. Actual production has been thereby materially increased in many lines, particularly where the character of the business requires changing the rolls at intervals. With a large volume of specifications ahead, the mill can make longer runs on each size, and will thus lose less time by making less frequent changes.

The benefits to the trade at large of a strict interpretation of contracts should have been more generally recognized. The rail trade furnishes an excellent concrete illustration. Rails are always sold for definite undertakings, and the contract is very tightly drawn. There is not one steel product of moment, outside of rails, which has maintained the same price since 1901. This line alone has been kept at the same figure, through two periods of heavy demand and one period of light demand. It is not to be claimed that other forces did not contribute to this record. They certainly did, but the methods by which rails are sold constituted by no means an unimportant factor in the net result.

CANADIAN BOUNTY SYSTEM IN THE BALANCE.

On June 30, 1907, less than two years hence, the Canadian bounties on the production of iron and steel will expire. The opinion is expressed by those claiming competence to know that the Laurier administration will not allow the bounty system to fall, but will insist upon its continuance. The subject is already a warm one and will become a more than warm one before the present bounty period expires.

It must be remembered, of course, that the basic rates,—which were on pig iron $3.00 on the proportion of Canadian ore used and $2.00 on the proportion of imported ore and on steel ingots made of at least 50 percent of Canadian pig iron, $3.00 per ton,—are being scaled down each year, so that in the last year, beginning July 1 next, only 35 percent of these basic

rates are to be paid. If the administration desires to continue the bounties, it can hardly be at a greater than the 35 percent rate. There will come up, of course, the question of continuing also the special bounties on certain rolled material, authorized in 1903, which are not on the diminishing scale.

Viewed from the standpoint of the iron and steel industry in the United States, the Canadian bounty system is open to great criticism. It is hard for a government to pay out cold cash in the form of bounties. It is estimated that to July 1, 1907, the Dominion Government will have paid out $7,000,000 in bounties. The Canadian opponents to the bounty system find in the largeness of this sum an argument against the system. American iron manufacturers, reflecting on the rapid growth on this side the line, would find an argument against the bounty system in its smallness. The Canadian Government paid bounties as far back as 1884, $1.50 on pig iron, and the present system was enacted in 1897, yet in 1904 Canada produced only 270,942 tons of pig iron and 148,784 tons of steel ingots and castings. Sixty-five years ago the United States made a larger pig iron production than this, and now has single blast furnaces which make almost as much. Certainly the results in Canada have not justified expectations.

It is an obvious principle that if a certain gross amount of money is to be paid out in bounties, it is better that the money should be paid in a short period rather than in a long one. The shorter the period the larger is the productive capacity which has been fostered by the payment of the bounty. The largest plant in Canada has had its blast furnaces in operation for four years, erection having been started no less than six years ago. Clearly it does not indicate much virility that bounties should have to be paid to the same interests, year by year, over such long periods.

In the United States much quicker action is certainly expected. Thus, the famous McKinley tin plate duty, enacted in 1890, provided that tin plate should be admitted wholly free of duty after Oct. 1, 1897, unless it should develop that in one of the intervening years the production should have equaled one-third of the net imports in one of such intervening years, the largest production being compared with the smallest imports. In the last fiscal year of that period the production was many times the imports, which had become negligible. The establishment of the American tin plate industry, as measured by subsequent development, had only barely begun, when the provision of the original tariff law was carried out. That is the kind of fulfillment the trade in the United States is accustomed to.

Altogether, it does not appear that the Canadian bounty system has given a good account of itself. To continue it after the present period has expired would mean chiefly the payment of bounties to enterprises which have already been established, and with which the only contracts ever made have been carried out. It should be regarded as a time when, if anything more is done, it should be in the way of new expedients, as in the enactment of a complete tariff system.

PRICES OF COKE AND ORE.

The uncertainty in regard to the cost of coke and ore is an increasingly important factor in the pig iron market. In view of the advance in the price of coke, it is not at all certain that producers will be able to sell their product for 1906 delivery at the prices recently quoted. Not only is the price of coke at present nearly $1 per ton higher than last year, but the question whether the capacity of the ovens will be equal to the demand of the blast furnaces during the winter is a serious one, and probable car shortage must also be considered. Enormous tonnages of coke have been contracted for during the last few days. One Eastern agent announces that his sales have surpassed all previous records, and that the lowest figure made is fully 75 cents higher than the prices obtained for the corresponding period a year ago.

The price of ore for 1906 is uncertain and, all things considered, it seems very probable that more than one consumer will have an opportunity to exercise his patience, although conservative opinion holds that there will be no runaway market and no famine. The tonnage capacity in blast is tremendous, but on the other hand the consuming capacity is also unprecedented. All signs point to a record breaking volume of business and steadily advancing prices for some time to come.

As we anticipated, the statements concerning iron sands of the west made in a recent contribution to *The Iron Trade Review* by Dr. David T. Day, of the United States Geological Survey, have not been concurred in by all mining experts who have investigated the subject. A dissenting opinion published in this issue by Horace Vaughn Winchell, economic geologist of the Anaconda Copper Mining Co., is a valuable contribution to the discussion.

The recent meeting of the Iron and Steel Institute in Sheffield, the first ever held in that city, was one of the most successful in its history. Papers of great value were read and the discussions were participated in by some of the most distinguished members. *The Iron Trade Review* was represented at the sessions by a special correspondent whose complete and accurate report will, we believe, be thoroughly appreciated by our readers. Some of the papers appear in this issue and all of the remainder will be published in the near future.

PERSONAL.

J. M. Shaw, auditor of the National Tube Co., Pittsburg, has resigned to enter business on his own account.

Henry C. Frick has given Wooster University $40,000 for an addition to the library building recently erected by him.

Benjamin F. Heaton has resigned as one of the receivers of the Fort Wayne, Ind., iron and steel mills and Simpson C. Leonard has succeeded him.

W. H. Douglas has been succeeded by F. E. Olin as New York sales agent of the Western Tube Co., Kewanee, Ill.

James E. Jopling, mining engineer of the Cleveland-Cliffs Iron Co., Ishpeming, Mich., is in Europe for a five-months' tour.

William J. Bodilly has been given the supervision of the Breitung Iron Co.'s mines, near Wilde, Canada, 14 miles from the Canadian Soo.

Charles L. Stevens has been elected to the vacancy in the Toledo Metal Wheel Co., Toledo, O., caused by the death of E. W. Tolerton.

Joseph Crawley, formerly of James Bonar & Co., Inc., and the Pittsburg Feed Water Heater Co., has assumed the vice presidency of the Cadwallader Tin Plate & Metal Co.

The Youngstown, O., Foundry & Machine Co., announces the appointment of B. G. Parker as secretary and treasurer and H. P. Parrock as assistant general manager.

W. G. Edmondson, connected with the Altoona shops of the Pennsylvania railroad, has been made engineer of tests of motive power, a position newly created by the Philadelphia & Reading Railroad Co.

George G. Blackwell, head of the Liverpool house of George G. Blackwell, Sons & Co., Ltd., will arrive in New York the last of this week and will visit the iron and steel centers of the country.

W. M. Douglass, who superintended the construction of a number of plants which were taken over by the American Steel & Wire Co., has severed his connection with that corporation.

J. D. Cubbage has resigned as assistant superintendent of the Carrie blast furnaces of the Carnegie Steel Co., Pittsburg, to accept a similar position with the Illinois Steel Co.

Harry Kennedy, formerly superintendent of the Wharton furnaces, Wharton, N. J., has been appointed superintendent of the new furnace of Pickands, Brown & Co., which is building at South Chicago.

J. H. Dickey has tendered his resignation as sales manager of the Bettendorf Axle Co., Davenport, Iowa. Mr. Dickey has several offers under consideration, but has not decided just what he will do.

Emil Lungreen, manager of the King & Andrews foundries at Chicago Heights, Ill., has accepted a position as general manager of the new foundry to be erected at Geneva, Ill., by the Geneva Foundry & Machine Co.

W. H. Lorenz, of Springfield, O., has accepted a position as chemist in the new foundry laboratory of E. R. Caldwell & Co., at Bradford, Pa. The new laboratory has been fitted up with the latest modern appliances.

Arthur E. Corbin is now in the employ of the J. Stevens Arms & Tool Co., Chicopee Falls, Mass. He is succeeded as secretary of the Connecticut Valley Labor Bureau by Arthur F. Bassett.

J. C. Loughry has resigned his position with the National Tube Co., in Lorain, O., where he has been employed, in order to devote all of his time to a special system of accounting for foundries and manufacturing establishments.

W. J. Richards, superintendent of Corrigan, McKinney & Co.'s mines on the Menominee range, has been appointed general superintendent for that company for the Lake Superior region, covering his own position and that formerly occupied by the late Amos Shepard, of Duluth. The company is opening two mines on the Mesabi, and is operating three there now, while it has a number in the Crystal Falls district and at Stambaugh and some small properties on the Gogebic range. Three new mines are being opened on the Menominee range, two at Crystal Falls and one at Stambaugh, as has been stated recentiy in *The Iron Trade Review.*

OBITUARY.

Charles R. Clark, for many years proprietor of a machinery and metal manufacturing business at Rochester, N. Y., died Sept. 26 at Peterboro, Ont., aged 63.

Mrs. Elizabeth Frick, mother of H. C. Frick, of Pittsburg, died at Wooster, O., Oct. 1, from paralysis. She was 86 years old.

Charles V. Lord, president of the Union Iron Works, and prominent in the business and political life of Bangor, Me., died recently at his home in that city, aged 79.

William Silver, Salem, O., treasurer of the Silver Mfg. Co., and a director of the Buckeye Engine Co. and the United Steel Co., of Canton, died Oct. 3 of typhoid fever.

Benjamin Ott, proprietor of the West Wisconsin Iron Works, and a pioneer furnaceman of the Northwest, died at LaCrosse, Wis., Oct. 2, of paralysis of the brain.

William B. Rankine, vice president and treasurer of the Niagara Falls Power Co., died Sept. 29 at Franconia, N. H., where he had gone in seach of health. He was interested also in the Ramano Iron Works and numerous other concerns.

Richard A. Healy, for many years head of the engineering department of the J. C. Todd Works, Paterson, N. J., died Sept. 26, at the age of 66. He was well known through his inventions.

Morris Heckscher, late vice president and treasurer of the Richard Heckscher & Sons Co., Philadelphia, owning and operating the Swede furnace at Swedeland, Pa., died Sept. 29, at his home at Bryn Mawr, Pa. He was a member of the class of 1887 at Harvard University.

George B. Anderson, senior member of the firm of George B. Anderson & Co., proprietors of the foundry and machine plant at Louisville, Ky., died Sept. 22 of tuberculosis. He was 56 years old and had succeeded his father as proprietor of the foundry.

Sutherland M. Prevost, third vice president of the Pennsylvania Railroad Co., and at one time the director of the Consolidated Lake Superior Co., died Sept. 30 at his home in Philadelphia, at the age of 60. He was also vice president of various other Pennsylvania railroad subsidiary companies.

Henry J. Hopper, ex-mayor of Jersey City and sales agent of the Crucible Steel Co. of America, died on Oct. 5 at his home, No. 85 Washington street, East Orange, N. J., after a brief illness from heart disease. He was a member of one of the most noted families of Hudson county, N. J., and had been connected with the steel business during many years.

Thomas Best, general manager of the Monongahela Tube Co., Wilson Station, Pa., died at his home in Dravonsburg, Pa., Sept. 23. He was born in England, Feb. 30, 1846, coming to America in 1870. He had been employed by various steel interests, notably the National Tube Co. Later he built the tube works at Duquesne and acted as general manager until the Monongahela company was formed.

INDUSTRIAL SECURITIES IN BETTER DEMAND.

ANNUAL REPORTS OF BIG CORPORATIONS ARE FAVORABLE.

High Call Money Rate, However, Prevents Heavy Dealing on Stock Exchange—The Week's Features.

The publication during the week of the annual reports of corporations with an aggregate capitalization of more than $220,000,000, all of them showing material increases in earnings as compared with the last fiscal year, had the effect of strengthening industrial securities, a number of which were so heavily dealt in as to become market leaders. The annual reports were accompanied by statements from authoritative sources of an unusually bright outlook in iron, steel and allied industries. The money situation continued as the market feature, however, and precluded dealing on any extensive scale. A rate of eight percent for call money, touched Wednesday, was again reached the following day, and exceedingly heavy rates prevailed through the week. The market generally strengthened toward the last of the week only to lose its gains on the publication of a weak bank statement, the effect of which was noticeable Monday. Securities were considerably stronger Tuesday. American Locomotive was much dealt in throughout the week and marked up a generous net advance. Colorado Fuel & Iron found many buyers, and Pressed Steel, American Car & Foundry and Railway Steel Spring were in steady demand. U. S. Cast Iron Pipe was also a favorite of the week, heavy dealing being due to the rumors of an initial dividend, which materialized Tuesday. U. S. Steel continued to enjoy its usual extensive market.

Crucible Steel Company of America.

The annual report of President Frank B. Smith, of the Crucible Steel Co. of America, which will be presented to the stockholders at the annual meeting, Oct. 18, shows that during the year ending Aug. 31, 1905, the net earnings of the corporation were $2,132,490.64. During the same period the total debt of the company was reduced from $6,203,767.06 to $3,650,189.87, a reduction of $2,553,577.19, including $33,000 of bonded indebtedness. Owing to the improvement in the company's financial condition it was unnecessary to issue any part of the $7,000,000 bonds authorized at the last annual meeting. If the expectations as to earnings are realized, President Smith sees no reason why the company should not begin to pay dividends on the preferred stock in the near future, though for a time it may be advisable to make them less than the full rate.

During the year the company has met all its current ob-

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quotation, Oct. 2	Closing Quo. Oct. 9	Changes	Date of 1905 Ann. Meet.	Par Value	Capital Outstanding	Dividend Basis	Dividend Being Paid	Dividend Date Last Div. Dec.
Allis-Chalmers Co	18¼	17⅞	− ⅜	Sept. 7	100	19,820,000		.....	.....
Allis-Chalmers preferred	61	59⅞	−1⅛		100	16,150,000	7 cum	.....	Feb., 1904
American Can	10¾	11	+ ¼	Feb. 7	100	41,233,300		.....	.....
American Can preferred	70	72	+2		100	41,233,300	7 cum	5 Q.	Oct., 1905
American Car and Foundry	37⅛	38¼	+ ⅜	June 29	100	30,000,000		.....	May, 1904
American Car and Foundry preferred	100	100	.....		100	30,000,000	7 n. c.	7 Q.	Oct., 1905
American Locomotive	53⅞	58½	+5⅝	Oct. 17	100	25,000,000		.....	.....
American Locomotive preferred	112⅝	113⅛	+ ⅜		100	24,100,000	7 cum	7 Q.	Oct., 1905
American Shipbuilding	58½	55	−3½	Oct. 4	100	7,000,000	4	4 Q.	Sept.,1905
American Shipbuilding preferred	105¼	103¼	−2		100	7,900,000	7 n. c.	7 Q.	Oct., 1905
American Steel Foundries	10⅛	10⅛	.....	Oct. 3	100	17,700,000		.....	.....
American Steel Foundries preferred	40¼	40	− ⅛		100	17,700,000	6 cum	.....	Aug., 1904
Barney & Smith	7	15	.....	June 6	100	1,000,000		.....	June, 1893
Barney & Smith preferred	130	128	−2		100	2,500,000	8 cum	8 Q.	Sept. 1905
Bethlehem Steel	29¼	29¼	+ ⅛	April 4	100	15,000,000		.....	.....
Bethlehem Steel preferred	88	87½	− ½		100	15,000,000	7 n. c.	7 Q.	Aug., 1905
Bullock Electric preferred	113	113	.....	Oct. 1	100	1,000,000	6	6 Q.	Oct., 1905
Cambria Steel	28½	28	− ½	March 21	50	45,000,000	6	3 S. A.	Aug.,1905
Cambria Iron	49	48¾	− ¼		50	8,468,000	4	4 S. A.	Oct., 1905
Colorado Fuel & Iron	40½	40¾	+ ¼	Oct. 16	100	30,132,000	7	.....	Apr., 1902
Colorado Fuel & Iron preferred	.....	.....	.....		100	2,000,000	8 cum	.....	Feb., 1903
Wm. Cramp & Sons Ship & Eng. Bldg. Co.	28	28	.....	May 25	100	6,048,000	5	.....	Nov., 1902
Crucible Steel	13¼	13	− ¼	Oct. 18	100	25,000,000		.....	.....
Crucible Steel preferred	68¼	66	−2⅜		100	25,000,000	7 cum	.....	Sept.,1903
Empire Steel	5	5	.....	Feb. 22	100	2,281,400		.....	.....
Empire Steel preferred	35	35	.....		100	2,500,000	6 cum	3 S. A.	Jan., 1905
Fay & Egan	60	60	.....	Feb. 21	100	1,000,000	5	5 Q.	.....
Fay & Egan preferred	118	118	.....		100	1,000,000	7 cum	7 Q.	Aug., 1905
General Electric	182⅝	179½	−2⅜	May 9	100	48,256,050	8	8 Q.	Oct., 1905
International Pump	22½	26½	+4	June 6	100	12,262,500		2	July, 1905
International Pump preferred	79¾	82	+2¼		100	8,85 ,000	6 cum	6 Q.	Aug., 1905
Lake Superior Corporation	17	17	.....		100	40,000,000		.....	.....
Niles-Bement-Pond	126½	126½	.....	Feb. 1	100	5,000,000	6	6 Q.	Sept.,1905
Niles-Bement-Pond preferred	108	108	.....		100	2,000,000	6 cum	6 Q.	Aug., 1905
Otis Elevator Co	60	60	.....	March 20	100	6,350,300		2 A.	Apr., 1905
Otis Elevator Co. preferred	108	106	−2		100	5,589,500	6 n. c.	6 Q.	Oct., 1905
Pittsburg Coal Co	15½	15	− ½	Feb. 11	100	30,135,000		.....	.....
Pittsburg Coal preferred	59½	57½	−2		100	30,716,200	7	.....	Apr., 1905
Pressed Steel Car	45⅞	46⅛	+ ⅛	Feb. 15	100	12,500,000	3		Aug., 1904
Pressed Steel Car preferred	96¼	97	+ ¾		100	12,500,000	7 n. c.	7 Q.	Aug., 1905
Pullman Palace Car	256	250	−6	Oct. 19	100	74,000,000	8	8 Q.	Aug., 1905
Railway Steel Spring	46½	47	+ ½	March 2	100	13,500,000		4 S. A.	Oct., 1905
Railway Steel Spring preferred	103	102	−1		100	13,500,000	7 cum	7 Q.	Sept.,1905
Republic Iron & Steel	24⅜	24⅛	− ⅛	Oct. 18	100	27,352,000		.....	.....
Republic Iron & Steel preferred	93¼	93½	+ ¼		100	20,852,000	7 cum	7 Q.	Oct., 1905
Sloss-Sheffield	71¼	71¼	.....	March 15	100	7,500,000	5	5	Oct., 1905
Sloss Sheffield preferred	105	106	+1		100	6,700,000	7 n. c.	7 Q.	Oct., 1905
Tennessee Coal & Iron	88⅜	86⅞	−1½	May	100	22,552,800		4 Q.	Nov., 1905
Tennessee Coal & Iron preferred	.....	.....	.....		100	248,300	8 cum	8 Q.	Nov., 1905
U. S. Cast Iron Pipe & Foundry	33	40⅛	+7⅛	June 28	100	12,500,000		1	Oct., 1905
U. S. Cast Iron Pipe & Foundry preferred	93⅞	97	+3⅛		100	12,500,000	7 n. c.	7	Dec , 1905
U. S. Steel	38⅝	37½	−1⅛	April 17	100	508,302,500		.....	Dec., 1903
U. S. Steel preferred	105½	104	−1½		100	360,281,100	7 cum	7 Q.	Aug., 1905
U. S. Steel 5's	98	98¼	+ ½		100	463,798,000	5	5 A.	.....
Virginia Iron, Coal & Coke	39½	39½	.....	Sept. 19	100	8,641,600		.....	.....
Westinghouse Electric	169½	167½	−2	June 28	50	20,986,350	10	10 Q.	Oct., 1905
Westinghouse Air Brake	.....	150	.....	Oct. 3	50	10,990,450	20	20 Q.	Oct., 1905

ligations, and in addition has anticipated payment of notes to the amount of $808,000. There are now no liens of any kind against the plants or properties other than the collateral trust bonds and mortgages ($171,932.56), the amount of which represents the price of several pieces of land at Clairton, now under contract of sale to the Clairton Steel Co. This sale, it is reported, will be consummated very soon.

Since the last annual statement the company has purchased the outstanding stock of the Canton Steel Co., and now owns all the property and assets of that company. As the physical condition of all the plants is better than ever before it was not necessary to charge off anything for depreciation.

An interesting portion of the report deals with the foreign business of the corporation. This business continues to grow and plans are now under way contemplating the establishment of branches in the far East, including Japan, China and Corea.

The following is the consolidated balance sheet of the corporation and subsidiary companies Aug. 31, 1905:

Assets.	
Property account	$44,004,970.20
Deferred charges to operation	74,720.28
Investments	128,400.00
Current assets	8,590,480.09
Total	$52,798,570.57
Liabilities.	
Capital stock, preferred	$24,436,500.00
Capital stock, common	24,578,400.00
Bonded debt	1,567,000.00
Mortgages	171,932.56
Current liabilities	1,911,257.31
Reserve for contingencies	65,000.00
Surplus, Aug. 31, 1905	68,480.70
Total	$52,798,570.57

The terms of the following directors expire in 1905: Reuben Miller, A. W. Mellon, Frank B. Smith, C. C. Ramsey and William H. Singer.

Dominion Iron & Steel Co.

The report of the directors of the Dominion Iron & Steel Co. of Sydney, N. S., to be presented at the annual meeting of the company on Oct. 18, has been issued. Owing to a change in the financial year which will hereafter terminate in May, the earnings are shown for only the first five months of 1905, and consequently do not include the income from the rail mill. The profit on sales Jan. 1 to May 31 was $366,062, which fully provided for the fixed charges and sinking fund. Apart from interest on the floating debt, the annual charges amount to $835,000. The report states that the output will shortly be increased by a third blast furnace, and improvements in the open-hearth department, and announces that Graham Fraser desires to be relieved from service as director of works at an early date.

American Car & Foundry Co.

President Frederick H. Eaton of the American Car & Foundry Co. has sent out to his stockholders a report which shows the net earnings for the quarter ending July 31, with dividend payments and comparative statements as follows:

	1905.	*1904.	*1903.
Net earnings	$ 625,312	$ 587,760	$ 1,578,073
Preferred dividends	525,000	525,000	825,000
Surplus	$ 100,312	$ 62,769	$ 753,073
Previous surplus	12,405,434	11,905,026	10,406,219
Total surplus	$12,505,746	†$11,967,795	†$11,159,292

*Three months ended Aug. 31. †Aug. 31.

Lake Superior Corporation.

The Lake Superior Corporation at its annual meeting in Jersey City, Oct. 4, made its first report for the year ending June 30. It shows an income of $585,539, total expenses of $550,737 and a surplus of $34,802. President Charles D. Warren reported that the last of the Canadian properties had passed into the corporation's hands and that the indebtedness had practically all been settled with a balance of about $1,000,000 of treasury bonds remaining for the use of the corporation. Legal expenses of reorganization, he reported, were necessarily heavy as was the cost of putting the great plant in operation after so long a period of inactivity. The outlook he declares most encouraging and predicts an output of rails of 150,000 tons for next year. The old board of directors were rechosen, Alfred P. Boller taking the place of George B. Turrell, deceased.

American Shipbuilding Co.

At the annual meeting of the American Shipbuilding Co. held at Jersey City, Oct. 5, President Jas. C. Wallace and the old organization were victorious over the faction of common stockholders discontented over the dividend policy. These directors were chosen: William L. Boren, H. H. Porter Jr., James C. Wallace, Robert Wallace, Robert L. Ireland, Russel C. Wetmore, H. M. Hanna, Edward Smith, Andrew M. Joys, L. M. Bowers, Alexander McVittie, A. B. Wolvin, William C. McMillan, Frank W. Hart and John A. McGean.

The annual report shows the resources of the company as $21,742,823.05, a gain of approximately $1,000,000. A comparative annual statement follows:

	1905.	1904.	Increase.
Gross earnings	$1,549,450	$1,028,175	$521,275
Charges depreciation and maintenance	315,408	209,718	105,690
Rebuilding	40,692	78,330	*37,638
Total charges	$ 356,100	$ 288,048	$ 68,152
Available for dividends	1,193,350	740,127	453,223
Dividends preferred	553,000	553,000	.....
Dividends common	.....	76,000	*76,000
Total dividends	$ 553,000	$ 629,000	*$76,000
Surplus	640,350	111,127	529,223
Previous surplus	3,678,442	3,567,315	111,127
Total surplus	$4,318,792	$3,678,442	$640,350

*Decrease.

President Wallace stated that during the past year 20 vessels were completed and delivered and 21 are now under contract or construction. This is taken to mean increased earnings for the current fiscal year. He added, "It seems to be thoroughly demonstrated in the minds of nearly all vessel owners that the larger size vessels and type of construction now being built are inevitable and that a large number of the old vessels will gradually be remodeled."

Financial Notes.

The American Rolling Mill Co. pays a quarterly dividend of 1¼ percent Oct. 15.

An advance of the dividend rate on common stock of the American Radiator Co. is rumored for Nov. 1, when the quarterly meeting of directors will be held.

Samuel McDonald, retiring general manager of the steel plant of the Tennessee Coal, Iron & Railroad Co., Ensley, in a parting speech to the men declared that the plant had made net earnings in the last three years sufficient to build a similar plant. This was the same as to say that the net earnings had been $5,000,000.

A statement issued by Alfred L. Baker & Co., Chicago, gives interesting statistics of the United States Steel Corporation for the first half of 1905 showing net earnings of $53,331,012, a surplus of $5,644,088, as against $1,080,257 for the corresponding months of 1904. The prediction is made that steel common will be put on a

dividend basis again, at which time it will pass the $50 mark.

Wall street has the report that the Central Foundry Co. is soon to make application for listing on the Stock Exchange. The stock consists of $6,650,000 common, $6,650,000 seven percent cumulative preferred and an issue of $3,863,000 20-year six percent debenture bonds. The company was organized in New Jersey in 1899 and has paid no dividends on preferred stock.

For the annual meeting of the Republic Iron & Steel Co. to be held Oct. 16, two sets of proxies have been sent out; one by the management of the company in the name of Alexis W. Thompson, Grant B. Schley, Charles S. Guthrie, John W. Gates and Harry Rubens, and the other is the same with the omission of the names of A. W. Thompson and Harry Rubens.

Rapid progress is reported in the reorganization of the Diamond State Steel Co. The plan provides for a capital stock of $4,000,000, of which $1,000,000 preferred is to be sold for cash, $1,000,000 common is diverted to preferred and common stockholders and the balance $2,000,000 is to be given as bonus with the preferred for the $1,000,000 new cash capital.

Earnings of the Cambria and Pennsylvania steel companies for 1905 are reported as approaching the heavy profits of 1902 and 1903, when Cambria Steel's net income exceeded $4,000,000, and Pennsylvania's was nearly as large. Most of the surplus earnings, however, will go back into improvements, as Cambria is spending $200,000 a month on its new blast furnace, and Pennsylvania is building coke ovens. Denials are entered of rumors that Pennsylvania Steel is to pay a dividend on its common and that Cambria Steel is to increase its dividend.

President F. J. Hearne of the Colorado Fuel & Iron Co. declares the gross earnings of the company for the past fiscal year considerably more than $2,000,000 in excess of the previous year, being placed at between $10,000,000 and $11,000,000 as against $8,625,676 in 1904 and $16,653,963 in 1903. The fuel department earned almost $1,000,000 in excess of the previous year. President Hearne is quoted as saying: "The cost of operating the steel plant was greatly lessened during the year, but reductions were not brought about by lowering wages. We have developed the Chicago and Sunrise mines in Wyoming to such an extent that we will not require ore from the Lake Superior region." President Hearne is to be continued in office and the report is that no changes will be made at the annual meeting Oct. 16.

Metal Trades Meeiing

The semi-annual meeting of the Administrative Council of the National Metal Trades Association will be held at the offices in Cincinnati, Oct. 18-19. The council is composed of the following:

J. W. Gardner, The Gardner Governor Co., Quincy, Ill.; F. A. Geier, The Cincinnati Milling Machine Co., Cincinnati, O.; W. D. Sayle, The Cleveland Punch & Shear Works Co., Cleveland, O.; F. K. Copeland, Sullivan Machinery Co., Chicago, Ill.; G. F. Steedman, Curtis & Co. Mfg. Co., St. Louis, Mo.; M. H. Barker, The American Tool & Machine Co., Boston, Mass.; P. B. Kendig, The Seneca Falls Mfg. Co., Seneca Falls, N. Y.; Jno. Kirby Jr., The Dayton Mfg. Co., Dayton, O.; O. B. Kinnard, Kinnard-Haines Co., Minneapolis, Minn.; C. E. Hildreth, Whitcomb-Blaisdell Machine Tool Co., Worcester, Mass.; C. Bermingham, The Canadian Locomotive Co., Ltd., Kingston, Ont.; G. K. Garvin, The Garvin Machine Co., New York; W. H. Pfahler, Abram Cox Stove Co., Philadelphia, Pa.

The plant of the American Tin Can Co., Davenport, Iowa, which was recently destroyed by fire with a loss of about $150,000 will probably be rebuilt.

DEATH OF FRANK H. MILLER.

Frank H. Miller, for many years a prominent figure in the iron industry of Southern and Central Ohio, died at his home in Columbus, Oct. 5, at the age of 61. Mr. Miller served four years in the Civil War, at the close of which he married Josephine Ross Clare, daughter of James D. Clare, who owned and operated Madison furnace in Jackson county and Bloom furnace in Scioto county. For several years Mr. Miller was connected with these two furnaces, leaving them to become associated with Churchhill, Thomas & Fuller, pig iron merchants, of Columbus, and later with Chamberlain, Turney & Baird. In 1895 he established the firm of Miller, Wagoner, Fieser & Co., which he left in 1900 to build the plant of the Columbus

FRANK H. MILLER.

Iron & Steel Co., of which he was vice president and general manager, until ill health compelled his retirement. In 1903 he organized the Southern Ohio Portland Cement Co., of which he was president and treasurer at the time of his death. He was prominent in the business life of Columbus, being at one time vice president of the Board of Trade. He is survived by a widow and four children, one of whom, J. Clare Miller, is sales agent of the Columbus Iron & Steel Co.

Steel Cars on Fast Trains.

The Pennsylvania Railroad Co. has completed plans for the purchase of 1,500 pressed steel passenger coaches at an expenditure of over $7,000,000. The Pressed Steel Car Co., Pittsburg, is reported to be the successful bidder for the big contract. A test of steel cars is now being made on the Long Island railroad, a line owned by the Pennsylvania Co. The new cars will each cost between $4,000 and $5,000; the cost of the wooden car ranges from $3,000 to $5,000 according to the finish. The intention is to use the steel cars on the Pennsylvania fast trains with the idea of reducing the possibility of fatalities in wrecks.

John Veith, for 25 years general mining superintendent of the Reading Coal & Iron Co., died suddenly at his home in Pottsville, Pa., Sunday, Oct. 8, from paralysis. Mr. Veith had a remarkable knowledge of the underground operations of the mines of the Schuylkill region, carrying a practically complete map of each colliery in his head.

DENIES THREATS OF LOCKOUT.

(Special Telegram.)

Pittsburg, Pa., Oct. 11.—At a dinner of the Merchants' & Manufacturers' Association at the Country Club last night, Francis L. Robbins, president of the Pittsburg Coal Co., said emphatically that he had never made any statement as to what the result would be of the conference with miners at Indianapolis, the latter part of next January. All statements that the Pittsburg Coal Co. would enforce a lockout he declared entirely false, adding that its representatives would go to Indianapolis prepared, as formerly, to offer the best wages and fairest conditions possible. Dr. J. Leonard Levy, the noted Jewish rabbi, who recently returned from Japan, spoke of the wonderful material progress being made in Japan. He also made a strong and eloquent plea for the establishment of an American Merchant Marine, noting that Japan, although so young, flies the Japanese merchant flag on 5,504 ships with a tonnage of 989,612.

British Branch Organized.

The Wellman-Seaver-Morgan Co., Ltd., has been incorporated with headquarters in London to carry on the British and European business of the Cleveland company. The capitalization, which is nominal, is £20,000. The British company will take over the European rights to manufacture the Wellman rolling mill, furnace, hoisting and other machinery and will be able to compete directly with European producers. S. T. Wellman, president of the Cleveland company, will be chairman of the British concern, and Benjamin W. Head, of the London firm of Jeremiah Head & Son, will be the managing director.

Late Pittsburg News.

(Special Telegram.)

Pittsburg, Pa., Oct. 11.—The Jones & Laughlin Steel Co. is rushing the clearing away of the old buildings for the erection of a new 26-in. structural mill, No. 14, and will build in record time if possible.

This afternoon the Carnegie Steel Co. will make the test of a new No. 3 rail mill at the Edgar Thomson works. It will roll seconds from Nos. 1 and 2 into light rails and No. 2, heretofore making chiefly light rails, can be kept on standard rails.

Rust Boiler Co., Pittsburg, which for two years has had its boilers made by another concern under its patents granted to E. G. Rust, general manager, is preparing plans for building its own boiler plant on the southern end of Neville island in the Ohio river, below Pittsburg, where 20 acres were recently bought by the Fownes and others who compose the Carrie Furnace Co.

New Radiator Concern.—The Orient Steel Radiator Co. has been incorporated in West Virginia with a capital of $2,000,000 by a syndicate of Pittsburg capitalists, including Julian Kennedy, C. E. Safford, Reid Kennedy, J. W. Lee and E. W. Mackey. Julian Kennedy, who holds the bulk of $1,000,000 preferred stock, will be president of the company. Options have been secured on sites near Pittsburg for the erection of a plant to cost approximately $750,000. A newly invented radiator made entirely of sheet steel stampings will be constructed. C. E. Bray, first vice president of the American Sheet & Tin Plate Co., is said to be heavily interested.

Twenty-nine mills of the American Sheet & Tin Plate Co., Vandergrift, Pa., resumed operations Oct. 9, after six weeks' shut down. About 700 men were re-employed.

LARGE RAIL MILL

May be Established in Ontario by Pittsburg and New York Capitalists.

Toronto, Oct. 9.—There is a prospect of the establishment in Ontario of a large rail mill by a syndicate of Pittsburg and New York capitalists whose representative has been recently looking over the ground. It is understood that instead of starting an entirely new industry they prefer to acquire a controlling interest in some small existing steel plant, with a view to its enlargement and the addition of a rail mill and blast furnaces, securing the interests of present stockholders. In this way the opposition created by their entering the field as a competitor would be to some extent avoided. The establishment here of a branch of the Capewell Horse Nail Co. has aroused strong antagonism in the trade, and rival concerns are vigorously assailing their methods through advertisements.

Major J. A. Currie, president and manager of the Imperial Steel & Wire Co., of Collingwood, left Toronto last week on a trip to Pittsburg.

A. L. Schultz, of Pittsburg, the engineer in charge of the construction of the big bridge plant being established in Buffalo in connection with the Lackawanna Steel Co., spent several days last week in Canada examining the field as a prospective market for the product.

Ground was broken on Oct. 6 for the erection of a two-story factory by Henry Disston & Sons, Ltd., at No. 112 Adelaide street East, Toronto. The firm is the Canadian branch of Henry Disston & Sons, Philadelphia, saw manufacturers, and was incorporated some time since under an Ontario charter with $100,000 capital. The factory will be in operation before the end of the year and will employ about 75 men. The firm intends to manufacture for the export trade as well as for the Canadian market. The manager is W. E. Radcliff.

Philadelphia Foundrymen's Association.

The 150th meeting of the Philadelphia Foundrymen's Association was held at the Manufacturers' Club, Philadelphia, Oct. 4. The report of the treasurer indicated a balance of $1,893 on hand, all bills having been paid.

President Devlin gave a short resume of his recent trip abroad, enumerating the various cities which he had visited in Europe and giving a general description of many places of interest, after which a discussion was participated in by several members on the subject of local business conditions, which are reported as very good.

Mr. Geo. C. Davis, the official chemist of the association, stated that a remarkably small number of the samples sent him were subject to dispute and as a rule iron is very satisfactory, but equally good conditions could not be reported concerning coke.

The paper of the evening was read by Mr. S. Newbold, of the Taylor-Newbold Mfg. Co., of Philadelphia, and will be published in *The Iron Trade Review* later, together with illustrations. There was considerable discussion of the paper.

Mr. J. W. Daniels, of the Atlantic Refining Co., told how a new process of producing castings of difficult or intricate nature was brought to his attention, and exhibited several samples of extremely fine work. He stated that the process would be fully covered in a paper prepared by the inventor which would probably be presented at the next meeting of the association.

All the machinists employed by the Baltimore & Ohio Railroad Co. have been granted a substantial increase in wages.

HEARTY WELCOME EXTENDED BY SHEFFIELD.

FIRST MEETING OF THE IRON AND STEEL INSTITUTE IN THAT CITY.

Some Interesting References to America—Pointed Criticism of Professors—Tribute to Dr. Sorby—The President's Address.

(Special Correspondence.)

SHEFFIELD, ENGLAND, Sept. 27.—Fine weather favored the visit of the Iron and Steel Institute to Sheffield, the first it ever made to this city. The usually smoky steel center wore an unwontedly cheerful aspect as the members entered the handsome building of the University on Tuesday morning, Sept. 26, the Firth Hall, with its decoration of flags and its bright colors, being flooded in sunshine. Several hundred members were present.

R. A. HADFIELD, PRESIDENT IRON AND STEEL INSTITUTE.

The more serious business was preceded by formal welcomes on behalf of the municipality. The Lord Mayor of Sheffield, Sir Joseph Jonas, occupied the chair, and was accompanied on the platform by Sir Chas. Elliott, vice chancellor of the University, and Sir Geo. Hall, master cutler of the University. The president of the institute, R. A. Hadfield, occupied a position to the left of the chair, and an imposing list of past and present officers were on the platform or in the immediate vicinity, including the following: Sir James Kitson, Edward Windsor Richards, E. P. Martin and Wm. Whitwell, past presidents; Sir John J. M. Alleyne, Sir Edward H. Carbutt, Bart., J. D. Ellis, James Riley and J. J. Snelus, Sir Hugh Bell, Bart., David Colville, A. Cooper, J. D.

MR. BENNETT H. BROUGH, SECRETARY OF THE IRON AND STEEL INSTITUTE.

Gledhill, A. Lamberton, J. E. Mead, F. R. S., A. T. Tannett Walker, J. M. White, I. Williams, Dr. Sorby, F. R. S., Dr. Wedding, of Berlin, Dr. Schroeder, of Dusseldorf, and Mr. Jonjon, of Moscow.

The Lord Mayor's Welcome.

Col. Hughes, chairman of the reception committee, introduced the Lord Mayor, Sir Joseph Jonas, who warmly welcomed the visitors. It was the first meeting held in that great hall since its opening by the King and he hoped that fact was a happy augury of its future and that this visit would be completely successful from a social and business point of view.

Sir Geo. Hall, Master Cutler, anticipated much benefit to the iron and steel city from the visit. The speaker

SIR JOSEPH JONAS, LORD MAYOR OF SHEFFIELD.

raised a laugh by a reference to the beautiful town, but he hastened to explain that he referred to the surroundings, which coupled with the world-wide reputation of Sheffield for good honest products, constituted their chief pride.

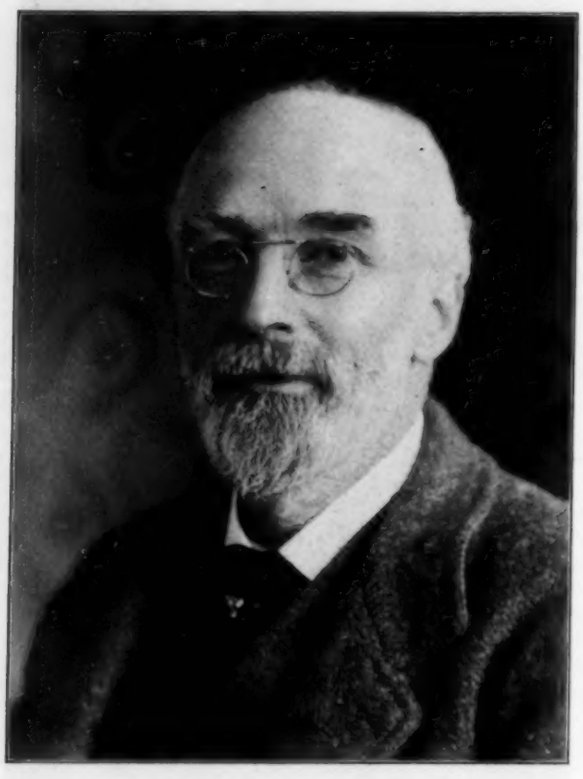
Sir Chas. Elliott pointed out that the Sheffield University was the only institute of the kind which recognized metallurgy as a science. That specialty he hoped would confer local distinction and renown. For such teachers there was a great practical opening. Professor Arnold, who had just returned from South Africa found that all the mining engineers, many of whom earned large salaries, amounting to several thousands of pounds, were almost without exception Americans. England certainly required some institution which would furnish material to supply such posts. While there had been differences of opinion on the part played by carbon in the constitution of steel, it was a significant matter that last year's Bessemer

medal was awarded to Sheffield's professor of metallurgy.

A Shot at Pittsburg.

R. Holinshaw, president of the Local Trades Council, speaking in behalf of organized labor, added a few words of welcome and aroused some merriment by the remark addressed specially to American visitors, that nobody could appreciate smoke like the visitors, and black as Sheffield smoks was, it was sunshine itself to Pittsburg as seen from the hill on the other side of the Allegheny river.

President Hadfield acknowledged the cordiality of the welcome. As a Sheffield man this visit realized a wish he had cherished for many years. Since the first meeting in Middlesboro in 1869 the Institute had visited no fewer than 38 different centers of metallurgical industry. The institute regretted the removal by death of Sir Lothian Bell, but Sir Hugh Bell would carry on his father's



SIR HUGH BELL.

great traditions. He offered also a special welcome to the veteran metallurgists, J. D. Ellis, Dr. Wedding of Berlin, Mr. Dumas from Paris and many others from America, the continent and many parts of Great Britain. He said that Sheffield had indeed taken a large and important part in the development industrially of steel and its applications.

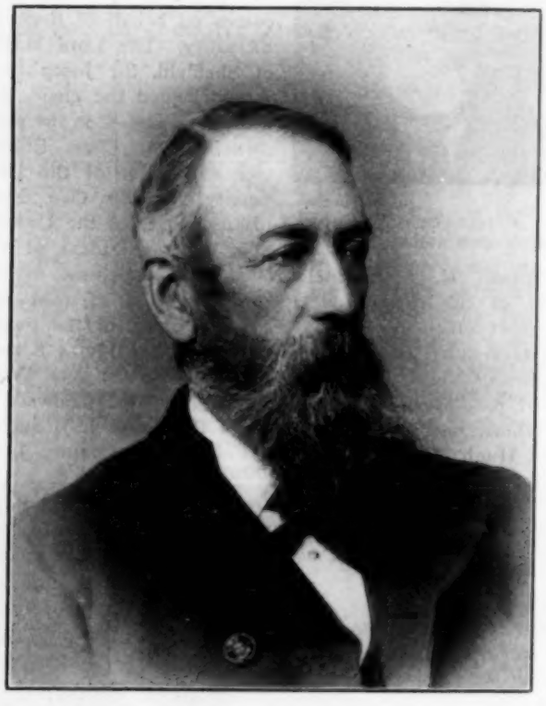
Tracing the history of the city from Chaucer's time when the author referred to Sheffield's "Thwitles" the speaker said the city had indeed been the cradle of the modern steel industry, and its development was largely due to Sheffield men. Whilst Bessemer was not a Sheffield man, the first practical developments of his process occurred there and were carried out by Sheffield men. Sir John Brown saw with his great foresight the importance of this process and his firm turned out some of the highest quality material for rails yet produced. The speaker had in his own possession an interesting photogragh representing pieces of rails and bars rolled by Sir John at the Atlas Works from the first rails made commercially of Bessemer steel and it contains the following remarkable inscription written by Mr. Bragge, then one of Sir John's partners:

An Historic Photograph.

"This photogragh was taken from the first rails ever made commercially in England of cast steel, produced by Bessemer's process, and when steel rails have superseded iron, as they certainly will do in the course of time, this picture will record who first had courage to introduce them to the world. May 1, 1861."

That remarkable prediction has indeed come to pass. Mr. W. D. Allen of Bessemer's firm in Sheffield had also largely helped in the development of the method of steel making.

The inimitable Holly from whose work the enormous development of Bessemer steel in America largely arose, did not go to South Wales or elsewhere, but came to Sheffield to be initiated, so that Sheffield might be rightly said to have taught America how to make the steel rails used in those lines of communication that have entirely



H. C. SORBY.

altered the whole face of the vast trans-Atlantic continent. In the same manner as regards the Siemens process, firms such as Vickers were largely instrumental in leading to the more rapid development and perfection of this method of producing steel. Then, too, they saw men such as Mark Firth, William Jessop, Charles Cammell and others, who were indeed pioneers and from whose labors the world today finds so great benefit. On the scientific side they had amongst others Dr. Sorby, who had rendered invaluable service to metallurgy by his initiation as far back as 1857 of methods of examining the micro-structure of metals, from which they today were obtaining much valuable information. Today Sheffield has probably the largest army of any city devoted to the production and working of steel, 30,000 men or more being so employed.

Fine Prospects Everywhere.

President Hadfield said it was a great satisfaction to preside over the Institute when trade prospects seemed so much better in every country. He trusted a wave of

prosperity was in store both for employers and employed. One trade union branch in Sheffield with 2,000 members had not a single member on its "unemployed" book. That was highly satisfactory as suggestive of better times. They did not want booms which were not alike for all, but continuous steady demand. The work done by the Institute spoke for itself and they had that day elected 150 members, raising the total roll to 2,200 members. The exceptionally large attendance constituted a record. In conclusion the president agreed with Professor Arnold that, much as he respected America, he though the English ought to train their own engineers.

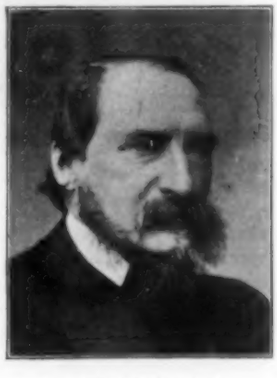
SIR J. G. ALLEYNE.

THOMAS R. BAYLISS.

The reading of a paper by Professor Arnold on "The Metallurgical Department of Sheffield University" was then proceeded with. This paper will be printed in an early issue of *The Iron Trade Review.*

Prof. Turner (Berlin), in discussion, heartily congratulated Sheffield on what had been done. They had a similar kind of plant in Berlin though differing in details. The use of such plants was most likely to yield the best results. They could no longer teach metallurgy as they might teach mathematics with a blackboard and a piece of chalk, but it was a mistake to suggest that such plants could be worked on commercial lines. He did not claim that he could make profit on his steel making and merely regarded his plant as an apparatus for scientific instruction. If they did not lose on the metal, but had to meet the charge of fuel and labor, he thought that was quite satisfactory. The ordinary student who had not seen practical work actually perfected could have no practical conception of steel making.

W. H. BLECKLEY.



T. DEVONSHIRE ELLIS.

Dr. Wedding of Berlin pointed out that in Germany practical experience of pupils in actual works for a couple of years was in all cases insisted upon. The pupils had to go as actual workmen at a blast furnace and then to a Bessemer and Siemens furnace. He would like every one there to see his own well arranged laboratory in Berlin.

Prof. W. Jowland, London, said he was trying to do in the laboratory line for gold, silver, copper and lead, what had been done with iron by Professor Arnold and Turney and it was intended to put down a plant of which England would be proud. The practical laboratory work was an absolute necessity; at the same time it was impossible in a laboratory to teach men their trade.

At the close of the discussion the president remarked that the highest compliment they could pay to Prof. Arnold would be to go and see his laboraotry.

Carbon Steel Discussed.

Prof. Arnold's paper on "Thermal Transformation of Carbon Steel" having been read, the president remarked that the paper had centralized a good deal of nebulous thought that had been floating around.

J. E. Mead, Middlesboro, opened the discussion by congratulating Sheffield University on her professors in metallurgy, but deprecated the despotic tone adopted by some professors as if they knew everything. They should rather invite pupils to add to the sum of knowledge. After working many years, he had come to the conclusion that it was impossible to explain the allotropic condition of iron by chemical means and as to "ghost lines," he had on more than one occasion proved they had more phosphorus than the surrounding metal. The rust lines were due to oxidation. J. M. Gledhill wished as a practical steel smelter that somebody would write a paper to tell them how to get rid of ghost lines. In two steels melted under precisely the same conditions one would have ghost lines and the other would not.

JOHN M. GLEDHILL.

COL. HERBERT HUGHES.

Prof. Bowerman of London pleaded for the simplification of terminology. He would like to see sham mineralogy abolished altogetner as serving no useful purpose of discussion. But as to troostite there had never been any donor. It was a name applied to a silicate manganese occurring in a particular locality.

Prof. Turner, of Berlin, said that 20 years ago he was much interested in the red crystals which Dr. Sorby discovered. He had sought for them in many kinds of iron since, in which he expected to find them, but had not done so.

Dr. Sorby, who was seated in a bath chair wearing his academical robes and apparently suffering from much weakness and ill health, had the vehicle turned round when addressing the meeting and received a very hearty reception. He said that twenty years ago very few people took any interest in his microscopic researches and it was now a matter of sincere pleasure to him to find his early conclusions so widely endorsed, knowing that he was now quite behind the times.

Prof. Lange, of Chester, pointed out that as the pro-

portion of iron and carbon in carbon steel varies, the temperature would affect the extent to which the carbon was dissolved into the iron. He rather favored the simplifying of those combinations by referring to them more or less as structures.

Professors Defended.

Mr. A. McWilliam deprecated the suggestion that professors were dogmatic. In the Sheffield University they received much education from the pupils whose ages varied from 16 to 61 and many of whom were managers of magnificent works.

Prof. Arnold in closing strongly complained of the unauthorized use of the term sorbite. Prof. Howe wrote to Dr. Sorby and got his permission to apply the term sorbite to certain red crystals. For any other scientists, without permission, to apply the name to other things was not only confusing, but an open breach of professional etiquette.

The paper on "Overheated Steel" by Mr. Stead and

JOHN EDWARD STEAD, F. R. S.

Mr. Richards was next read. This paper is printed elsewhere in this issue of *The Iron Trade Review*.

John M. Gledhill, Manchester, said it was a matter of vital and practical importance to distinguish between burnt and overheated steel and to know how either could be restored. It was manifestly unjust to accuse the seller of supplying bad steel if its condition was due to the heat playing improperly over the metal or the faulty condition of the furnace.

E. P. Martin said overheating might be continued up to melting, but steel might be burnt at a comparatively low temperature by a flame containing too much oxygen. Nothing could possibly restore burnt steel. Mr. Morgan pointed out that overheating was shown sometimes in the tensile tests but almost always in the elongation. The ordinary tests would show it quite sufficiently and there was no value in special tests. Prof. Lange gave instances where the spoiling of steel clearly took place in the treating of the blooms in the furnace.

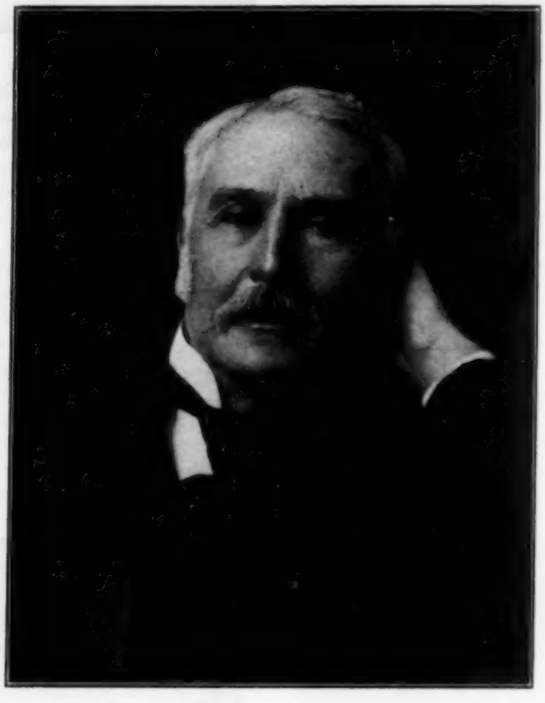
Mr. Stead in closing expressed the hope that other contributions to the discussion would be made in writing.

The secretary, Mr. Bennett Brough, read an abstract of Prof. Guillet's paper, "The Use of Vanadium in Metallurgy," the gentleman being detained in Paris by a family affliction.

The president observed that the French nation had gone ahead in connection with motors and English metallurgists were partly to blame because they had not given the strikingly high quality of steel necessary for resistance to shock.

Some Startling Discoveries.

Mr. A. F. Wiener, London, said they were on the eve of startling discoveries as to the effects likely to follow from the use of vanadium in small quantities. Experiments had been made with a proportion of ten percent, but such an excessive use could lead nowhere. Mr. Mark Robinson remarked that the author was evidently unaware of the extent to which manufacture of vanadium was carried on in Great Britain. English motor car build-



L. W. VICKERS.

ers were really very considerable users of vanadium steel and a considerable commercial business in the metal had been established.

Mr. Kent Smith endorsed this remark, observing that five different types of the steel were now being produced, of which two were used to a considerable extent. It was valued mainly on account of its resistance to shock where the ordinary Admiralty tests proved that while steel stood 25 blows, vanadium steel survived 75. Vanadium is a valuable ingredient, but like strychnine should be used with very great care and discretion. Dr. Matthews, New York, sent in his experiments. He found resistance to tensile strain and shock in vanadium very high as compared with ordinary carbon steels, at the same time having good elongation and reduction. But his experiments with water hardened steels has not shown such promise in that direction. It appears

that its use was practically limited to those steels in which tensile properties and resistance to shock were desired.

At this stage the institute adjourned for lunch to the Cutlers' Hall and the afternoon was spent in visiting the University Metallurgical department and inspecting the laboratories, Western Park, the Museum and Mappin Art Gallery also being reserved for the use of the members and their friends.

In the evening the Lord Mayor and Lady Mayoress held a reception.

Segregation in Steel Ingots.

Mr. R. A. Hadfield was again in the chair on the resumption of the proceedings on Wednesday, when Mr. Bennett H.

ARTHUR KEEN.

SIR JOSEPH LEIGH.

Brough read an epitome of the paper on "Segregation in Steel Ingots," by Mr. B. Talbot.

In discussion Mr. Stead stated that all practical metallurgists should study the subject. After 15 years' consideration of it he found many things far from clear. They sometimes wished they could get inside the furnace and the ingot to see what was going on. But it was an axiom that rapid cooling resulted in development of small primary crystals, and a second axiom was that agitation even to a very small extent yielded small crystals. Perfect quietness, freedom from motion and very slow cooling developed very large crystals. There must be a separation of the two parts, the solid, which was purer than the liquid, remaining. In proportion

BENJAMIN J. TALBOT.

W. TOZER.

as the crystals were large and the branches large they would have a greater or less amount of mechanical segregation. Mr. Stead's theory was that aluminum prevented circulation, and consequently the top froze more rapidly than if aluminum were absent. If the steel was quiet when crystallizing they had inside the mold what was equivalent to majestic fir forests, which were continually mechanically enclosing segregations and preventing their escape to the upper part of the ingot. When the crystals were small this was not the case. The segregations entangled in the growing crystals might be described as ghosts, and when drawn out they formed long white lines due to phosphorus. Aluminum caused mechanical segregation all through the mass, and so made it all the more regular. Was it not advisable to treat steel intended for guns or shafts in such a way as not to prevent segregation, but facilitate it? In other words get all the impurity in the upper part of the ingot which they invariably rejected, retaining the remainder as free as possible. The proper thing to do was to keep the steel inside the mold in a state of slight agitation to reduce the small crystals and drive all the impurities to the top.

At this stage the chairman gave a warm welcome to Col. Vickers, who ascended the platform, remarking that the Colonel had probably turned out more high-class steel than any maker in the country.

Rejected Rails.

Mr. Harbord agreed that in many cases such as in casting gun metal, the right thing was to facilitate segregation and cut off the segregated parts. But they could not afford to do that with the great mass of steel for structural purposes and rails. They did not like segregate areas in rails, though they endured them for their sins. And if for a few pence per ton spent on aluminum they could eliminate them, it was a matter of vital importance. They knew that rails made under contract were often rejected on analysis, and that it

SIR LLOYD WISE.

STANLEY WATSON.

might be due to the fact that the segregate portion was not sound. To prevent that would put an end to otherwise endless worries. When they added aluminum to the metal it left the ladle more clean than otherwise. There was an increased facility of flow. Why that was so he could not explain. Mr. Harbord thought it was a mechanical action sweeping out the oxides and enabling the metal to flow more readily, and he entirely agreed with Mr. Stead as the effect of a quiescent state.

Prof. Johns pointed out that a large mass of steel could not be frozen instantaneously, and if they cooled it too quickly they would set up local segregation.

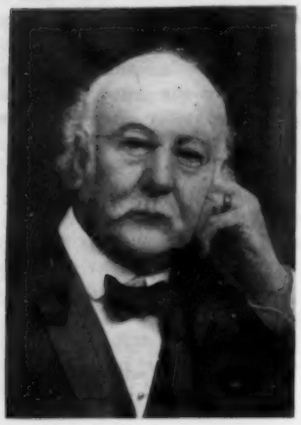
Mr. A. W. Richards remarked that every ingot and rail was segregated more or less, and Messrs. Bolckow, Vaughan & Co. had for years totally abandoned the sanding and shutting down of ingots, which they found reduced segregation. The real object was to avoid honey-combing and consequent unsoundness, which led to premature deterioration. If steel is properly blown and recarburized, there is no necessity to use aluminum. Indeed three or four ounces to the ingot would set it too quickly and produce a distinct pipe. He considered segregation was no detriment so long as it was unaccompanied by unsoundness and piping. It was beneficial rather than detrimental.

Too Favorable for Aluminum.

Mr. Saniter strongly held that four ounces of aluminum would produce a cavity. He thought the writer of the paper

had made out a more favorable case for aluminum than the facts would warrant.

Mr. Twyman thought it an extraordinary thing to suggest the use of aluminum as an alloy with a heavier metal. In his own experiments he had found it actually floating on the top.



E. WINDSOR RICHARDS, PAST PRESIDENT.

Mr. Paul pointed out that in charges treated exactly the same he had found one charge taking longer to cool than the other. Sufficient allowance had not been made for the ebullition of gases. The absence of gases in one steel made it set more quickly.

Dr. Bone pointed out that a rapid ebullition of gases was equivalent to the effect of a rapid agitation in the internal parts of the metal, causing rapid crystals. The action of aluminum was bound up with the liberation of gases.

Mr. Longmuir held that aluminum had very limited virtue, and the less physic they used in steelmaking for certain purposes the better. If they could produce sound steel without aluminum all the better. Aluminum might be of service if good steel could not be produced otherwise.

Mr. Ralph Scott said he found in regard to crank axles that he did not get such good tests with aluminum, especially in respect of elongation as without it.

Mr. Talbot, replying to the discussion, admitted they had found cavities but not pipes in the centre of the ingots. The quantity of aluminum used was not left in the steel. It was all oxidized out.

The chairman stated the discussion was one of the best they had ever had in connection with the Institute.

Manipulator for Steel Bars.

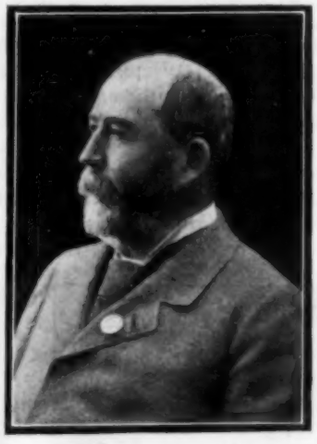
The next paper read was entitled, "A Manipulator for Steel Bars." In opening the discussion Mr. John Evans said that the employment of three machines on one side of the rolls was rather complicated. Nor could he understand why a machine should be designed to do work with eight cylinders. It was quite possible to devise machines to do away with all the arduous manual labor employed in the mills.

Mr. Windsor Richards, Caerlon, held that Mr. Upton had not been very successful, because he had only reduced the number of men from ten to five. Why did he keep the five? At Dowlais works there was not a man at the mill except the man looking after the guides on either side of the rolls, and they rolled 400 tons a week without a roller, the manipulators being worked by a boy. It was a splendid piece of apparatus.

Mr. Upton, replying, said his main reason for reading the paper was that he wanted to know how many men had literally invented and patented the identical machine. There were not so many as he expected. The manipulator had been running 15 months, and they had not had the slightest trouble with it.

This discussion was followed by the paper by Dumas on "Reversible and Irreversible Transformations of Nickel Steel." In discussion, Dr. Wedding, Berlin, said that it is very difficult to introduce manganese into the alloys of iron, nickel and carbon, because in the crucible the mass sometimes gave off 10 percent of manganese. It was impossible to fix the amount, and he would be glad to know a way to get over the difficulty. The chairman remarked that great molecular changes took place under such circumstances, the understanding of which would clear up many other doubtful points.

In the discussion of the paper entitled "The Presence of Greenish Colored Markings in the Fractured Surfaces of Test Pieces," Mr. Gledhill said that they must all admit the presence of these markings was detrimental to the homogeneity of the steel of which guns were made. The cause was the presence of silicon. It appeared to suggest that the whole thing depended upon the way the charge was worked. His own impression was that an ingot cast in a composition-lined mold would produce a superior forging less liable to erosion and to markings than an ingot cast in a chill.



EDWARD P. MARTIN.

Value of Steel in a Gun.

Gen. Woolf Murray, of the ordnance department, and Gen. O. Callaghan, his colleague, were then welcomed by the chairman, and Gen. Callaghan, speaking as an amateur, said the value of good steel in a gun was of the highest importance. But he much regretted the invention of the phrase "the life of a gun." That was interpreted to mean the firing of so many rounds. For example, if the life was represented by 150 rounds, people supposed that 151 would burst the gun, which was absurd. They ought to speak of the life of the rifling. When the erosion increased the projectile ceased to rotate. They were all trying to coax the guns to give greater velocity.

The time being now expired the rest of the papers were taken as read.

On the proposition of the president, hearty votes of thanks were accorded to the Lord Mayor of Sheffield, the Master Cutler for their welcome, the vice chancellor of the University for the use of the building, and others who had contributed to the success of the gathering.

The president said it gave him great pleasure to announce that the Mining Engineers of America and other kindred bodies had accepted an invitation to attend the meeting to be held in London next August or September. They had greatly enjoyed their visits to America, and this return visit would be a source of great satisfaction to them all.

This concluded the proceedings, after which a large number of the members accepted the invitation of the president to visit the works of his firm, the Hadfield Steel Foundry Co., Ltd.

The sailing ship is rapidly becoming obsolete, and promises before long, except for pleasure purposes, to be extinct. A greater tonnage of sailing ships is either lost at sea or broken up than the tonnage built, and the sailing vessels in the shipbuilding yards decrease every year. On June 30 there were 4,831 tons of sailing ships building in the United Kingdom. Three years ago the tonnage of sailing ships building was 26,840, so that in this period the tonnage building has dwindled to about one-sixth.—[The Mechanical Engineer.

OVERHEATED STEEL.*

BY ARTHUR WINDSOR RICHARDS AND JOHN EDWARD STEAD, F. R. S.

Prof. Howe, in his "Metallurgy of Steel," states that "Steel which has been exposed to a very high temperature is known as 'burnt.' It is cold-short and brittle, can be forged and welded only with care, and has a low tensile strength. Its fracture is coarse and even flaky, crystalline, with brilliant facets. Steel known as 'overheated' has a coarse structure, which may be removed more or less completely by reheating or careful forging. Excessively long or strong overheating produces the structure known as 'burnt,' and the coarseness and brittleness due to burning are removed with greater difficulty and much less completely than those due to overheating, yet in the same manner and by the same expedients."

ARTHUR W. RICHARDS.

The same authority, in his work on "Iron, Steel, and Other Alloys," states: "As a palliative for burning, mechanical refining by rolling, etc., is much more effective than heat refining, as we should naturally expect. For while heat refining should be powerless to close up even the most minute cracks, the compression and kneading which accompany mechanical refining should have a powerful effect in closing cracks even of considerable size, especially if their sides have not become coated with iron oxide."

In the glossary at the end of Mr. William Metcalf's book, "Steel: A Manual for Steel Users," is given the following definition of overheating:

"*Overheated.*—Steel that has been heated too hot, and not quite burned; its fiery fracture exposes it. The grain of overheated steel may be restored, but restored steel is never as reliable as steel that has not been overheated. Overheating is a disintegrating operation."

In Prof. Alfred Stansfield's paper on "The Burning and Overheating of Steel," overheating is defined as "reheating to below the point of incipient fusion," and that "steel that has been merely overheated can be completely restored by heating just above its highest recalescence point and allowing to cool."

Mr. Rogers' most valuable researches on "The Fatigue of Steel," indicate that steel with 0.27 percent carbon, after overheating at 1,215° C. for three hours and reheating to 900° C. for 10 minutes and cooling in air, compared with the normal steel after annealing it at 655° C. for half an hour, was restored to a higher fatigue-resisting character. The results given are as follows:

	Normal annealed at 655° C. 17.78 Tons Fibre Stress	Overheated at 1215° C. 16 Tons Stress	Restored. 17.78 Tons Stress
Reversals to produce fracture	1,493,600	636,950	2,692,700
Ratio.....	1	0.42	1.80

The bars as rolled, however, before annealing for a short time at 650° C. stood more fatigue than the restored steel, inasmuch as it took 2,630,100 reversals at 19 tons stress to produce fracture, while the restored steel broke down with 204,350 reversals at 19 tons stress.

The experience of all steel founders has proved beyond doubt that their castings, when they leave the molds, are very coarsely crystalline and more or less brittle, and that reheating to between 800° and 900° C. destroys the coarse crystallization and removes the brittleness. The physical character of overheated forged steel is identical with that of steel castings, excepting that the latter are liable to contain intercrystalline deposits. One would naturally expect that the same heat treatment would be followed in each class of material, with the same improvement.

Capt. H. Riall Sankey and Mr. J. Kent Smith in a recent paper show that after overheating their chrome-vanadium steel at 1,200° C. for 12 hours and reheating to 950° for half an hour the mechanical properties, according to all the tests applied, compared with those of the raw steel, were much improved.

In a previous paper it has been shown that, provided the heating was not carried to the point of disintegration, overheated steel could be completely restored to excellent quality, and made even superior to what it was in the forged condition.

In traversing the expressed conclusions of the authorities quoted it seems evident that both Prof. Howe and Mr. Metcalf, although they are emphatic in their statements that "heat refining" removes coarse and produces fine crystallization, are not so strongly convinced that the steel will be completely restored; indeed, Metcalf states that "restored steel is never so reliable as steel which has not been overheated." The remark, however, that "overheating is a disintegrating operation" clearly shows that what is meant here by overheating is incipient disintegration.

Prof. Stansfield's simple definition of overheating is practically that which we hold, qualified by the obvious

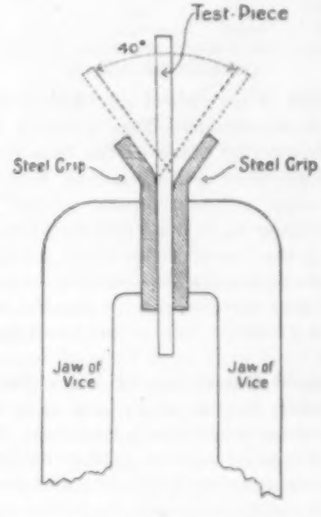


FIG. 1.—BENDING TO FRACTURE.

inference that until the point of incipient fusion is reached there cannot be any disintegration.

High carbon crucible steel, such as was available at the time when Mr. Charles Wardlow made his experiments in Sheffield in 1820, is very easily incipiently disintegrated by heat, as is proved by the fall in the specific gravity produced by high heating. Reheating will not perfectly restore it unless it is forged to a smaller size, and not even by forging if the steel has suffered severe disintegration.

The confusion existing appears to have arisen by con-

*Abstract of a paper presented at the meeting of the Iron & Steel Institute, Sheffield, England, Sept. 27, 1905.

founding "burnt" with "overheated" steel, and it certainly seeems to us that this will disappear if the following definitions of overheating and burning are accepted, viz.:

Overheating is heating at any point below that which produces incipient disintegration and results in the formation of large crystals.

Burning is heating at or above the point at which such disintegration occurs; burnt steel is nearly always coarsely crystalline.

If these definitions are accepted, the following facts should be remembered:

(1) That all overheated steel is more or less coarsely crystalline.

(2) That different steels apparently of the same composition vary in their susceptibility to disintegration. At a given high temperature one may be simply overheated whilst another may be burnt and partially disintegrated.

(3) That burnt steel cannot be completely restored by reheating; it can be greatly improved, but is never equal to reheated steel which has not suffered partial disintegration.

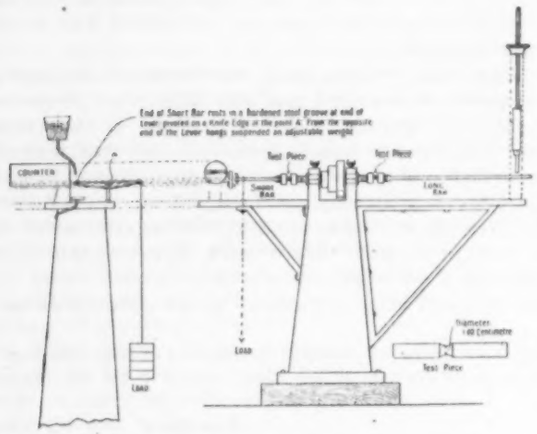


FIG. 2.—RICHARD'S AND STEAD'S MACHINE FOR TESTING STEEL BY REVERSAL OF STRESS.

As an example of such burnt steel before and after heat treatment photomicrographs, Figs. 4 and 5, are given, in which it is shown that some of the broad ferrite sheets or bands remain after reheating, and these are divided centrally by some substance quite foreign to the steel proper. On attempting to bend this steel the ferrite bands broke up along the line or plane of the foreign substance, and this of course led to sudden fracture through the whole mass. Such burnt steel is only fit for the scrap-heap or remelting; it is worthless until it has again passed through the fluid state.

General Description of Work Done.

In this research, instead of working upon rails we have mainly confined our work to the treatment of 1-in. square rolled bars. The tests applied were as follows:

(1) Testing for maximum tenacity and elongation in a 50-ton Buckton machine having a hydraulic cylinder driven from an accumulator and belt-driven pump coupled to a motor running at a constant speed.

The yield point was observed by means of a pair of callipers adjusted to suitable marks on the test-piece. The diameter of the bars, turned parallel, was 0.75 in., and the portion subjected to tension 4 in. in length.

(2) Ordinary bending tests. The pieces tested were cut from the bars and were highly polished, being of the following dimensions:

Length, 100 millimetres; breadth, 6 millimetres; thickness, 3 millimetres.

The measurements recorded in the table of tests represent the radius of the convex side of the bend when fracture occurred.

It will be understood that the greater the radius the less ductile the steel, and vice versa.

(3) Alternate bending of strips, having a section 6 millimetres × 3 millimetres, through an angle of 40°. The number of bendings backward and forward to produce fracture was recorded in each case. The apparatus used for this alternate bending is shown in Fig. 1.

(4) Rotary bending through a constant slight angle, of round pieces of the same dimensions as those used for fibre stress testing described in (5).

(5) Testing by reversals of stress, by the Wohler method, on a machine built by Messrs. Richardson, Westgarth & Co., to design supplied by us. This machine is shown in end and side elevations in Fig. 2.

The machine consists of a strong steel spindle on which is mounted three pulley wheels, giving speeds of 800, 1,200 and 2,400 revolutions per minute when driven by a suitable motor. The spindle moves in massive bearings, and each end terminates in a modified form of self-centering chuck in which the test pieces are securely fastened.

To one end of the machine is attached a short steel bar 10 in. long, also with suitable chuck, which is connected to the spindle by the test-piece, one end of the bar running free, and having a groove in which is loosely fitted one end of a hardened steel lever carrying the load used in testing. The other end of the machine is similarly fitted, the bar being 42 in. long, and the load is applied by means of a spring balance.

A suitable counter for recording the number of revolutions is also attached.

The test-pieces were uniform in size, being 4 in. long and turned to a diameter of ½ in., the center of each being further reduced by a semicircular groove to a diameter of exactly 1 centimetre. (See Fig. 2.)

Description of Treatment and of the Terms Used.

(1) *Normal Steel.*—Bars tested in the condition as received from the rolls.

(2) *Overheating.*—The bars were packed in quartz sand in a closed firebrick tube and heated at a temperature of about 1,300° C. for from two to three hours. The tube with contents was allowed to cool in air before opening.

(3) *Reheating.*—The overheated steels were packed in a closed firebrick tube and heated in a muffle furnace until a temperature of 880° C. was reached, with the exception of Series F, which were heated to 950° C. The tubes with their contents, as soon as the desired temperature was reached, were removed and allowed to cool in air before opening.

(4) *Annealing.*—The rolled bars were slowly heated in a muffle furnace to a temperature of from 850° to 880° C., with the exception of Series F, which was heated to 950° C., and were then withdrawn and allowed to cool in air.

(5) *Sorbitic Treatment.*—Portions of the rolled bars of Series H were heated to 900° C., quenched in cold water, and afterward reheated to 330° C. for 20 minutes and allowed to cool in air.

Ordinary Bending Tests.

Section of bars 6 millimetres by 3 millimetres.

		F	G	H	
Normal	radius of bend	6.50	7.25	8.00	millimetres.
Overheated .	" "	7.00	10.80	12.20	"
Reheated ...	" "	6.00	6.65	6.40	"
Annealed ...	" "	6.00	6.80	7.00	"
Sorbitic	" "	....	....	6.00	"

The bends to which the various test-pieces were subjected are shown in Fig. 3.

At 6 millimetres radius the bends were quite close on the concave side.

Tensile Tests.

Series		Yield Point. Tons per Square Inch	Ultimate Stress Tons per Square Inch	Ratio of Yield Point to Ult. Stress. Percent	Elongation Percent in 4 Inches	Contraction of Area Percent
F 1	Carbon, 0.06 percent normal	16.05	24.40	65.70	35.00	66.30
F 2	" " overheated	14.75	23.80	62.00	33.00	60.80
F 3	" " reheated	15.85	24.20	65.50	40.00	67.10
F 4	" " annealed	15.65	23.60	66.30	37.00	70.90
G 1	Carbon, 0.48 " normal	27.20	45.80	59.70	19.00	34.50
G 4	" " overheated	27.40	46.90	58.50	10.00	26.50
G 3	" " reheated	27.00	45.80	59.00	22.00	38.60
G 2	" " annealed	22.00	48.30	55.30	21.00	36.50
H 1	Carbon, 0.44 " normal	21.70	40.20	53.80	23.00	48.80
H 2	" " overheated	20.60	41.30	52.40	12.00	20.60
H 3	" " reheated	22.00	40.20	54.70	25.00	51.10
H 4	" " annealed	21.30	39.90	53.40	24.00	50.00
H 5	" " sorbitic	43.40	55.10	78.70	25.00	56.80

Alternate Bending of Strips Through an Angle of 40 Degrees.

Series		Average Bends to Produce Fracture	Comparison. Normal = 1
F 1	Carbon, 0.06 percent normal	48	1.0000
F 2	" " overheated	36	0.7500
F 3	" " reheated	53	1.1041
F 4	" " annealed	52	1.0833
G 1	Carbon, 0.48 percent normal	115	1.0000
G 2	" " overheated	51	0.4434
G 3	" " reheated	116.3	1.0113
G 4	" " annealed	115.3	1.0026
H 1	Carbon, 0.44 percent normal	117	1.0000
H 2	" " overheated	72	0.6125
H 3	" " reheated	132	1.1271
H 4	" " annealed	129	1.1000
H 5	" " sorbitic	263	2.2444

Resistance to Alternating Fibre Stresses.
Revolutions per Minute, 1,200.

Series		Total Revolutions to Produce Fracture	Comparison. Normal = 1	Fibre Stress
F 1	Carbon, 0.06 percent normal	13,560	1.0000	25 tons
F 2	" " overheated	9,700	0.7197	25 tons
F 3	" " reheated	14,500	1.0693	25 tons
F 4	" " annealed	14,200	1.0471	25 tons
G 1	Carbon, 0.48 percent normal	83,550	1.0000	28 tons
G 2	" " overheated	38,660	0.4627	28 tons
G 3	" " reheated	111,500	1.3226	28 tons
G 4	" " annealed	103,130	1.2344	28 tons
H 1	Carbon, 0.44 percent normal	1,432,500	1.0000	25 tons
H 2	" " overheated	844,950	0.5891	25 tons
H 3	" " reheated	2,080,440	1.4528	25 tons
H 4	" " annealed	1,971,000	1.3773	25 tons
H 5	" " sorbitic	3,517,200	2.4570	25 tons

Rotary Bending Through Angle of 6 Degrees.
Revolutions per Minute 1,200.

Series		Total Revolutions to Produce Fracture	Comparison. Normal = 1
F 1	Carbon 0.06 normal	3,500	1.000
F 2	" " overheated	2,590	0.7400
F 3	" " reheated	3,730	1.0655
F 4	" " annealed	2,680	1.0510
G 1	" 0.48 normal	3,940	1.000
G 2	" " overheated	2,040	0.5177
G 3	" " reheated	5,300	1.3451
G 4	" " annealed	5,120	1.3000
H 1	" 0.44 normal	3,660	1.000
H 2	" " overheated	2,207	0.6306
H 3	" " reheated	5,390	1.4731
H 4	" " annealed	5,215	1.4255
H 5	" " sorbitic	9,280	2.5361

In reviewing the results of our experiments, what appears to be most remarkable is the fact that the indications obtained by all systems of testing prove that overheating reduces the power of the steel to resist fatigue; that reheating such steel more than restores the original good qualities of the rolled bars; and that when the steel has the carbon in the sorbitic condition its power of endurance is more than doubled.

Heat Treatment of a Broken Axle.

(Series 1.)

By the kind permission of Mr. James Holden, of the Great Eastern Railway Co., we are able to describe experiments made to determine the effect of heat treatment on a wagon axle, which broke at a flaw after being in use for 20 years. The microstructure indicates that it had

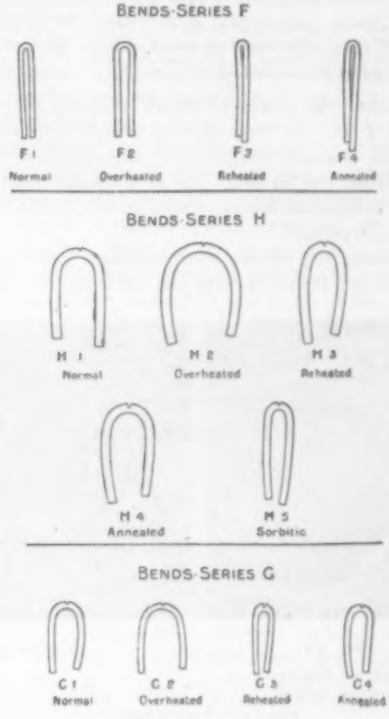


FIG. 3.—BENDS.

been initially slightly overheated. The analysis made by Mr. J. H. B. Jenkins, chemist to the Great Eastern Co., of a portion of steel cut from the axle, was as follows:

Carbon	0.349 percent.
Manganese	0.837 "
Silicon	0.053 "
Sulphur	0.047 "
Phosphorus	0.085 "

Portions were cut from the axle under the wheel seating, where the stresses during the life may be assumed to have been inappreciable, and from near to the central axis where the fatigue stresses must have been at a maximum and near to where the fracture occurred. One portion of each was reheated in a muffle furnace to 820° C. and was cooled in air; these, with other untreated portions, were tested in a tensile testing machine at the Stratford works of the Great Eastern Railway Co. with the following results, viz.:

Tensile Test.

	Central Axis		From under Seating	Wheel
	Untreated	Reheated at 820° C.	Untreated	Reheated at 820° C.
Ultimate stress	37.83 tons	39.28 tons	38.31 tons	39.71 tons
Elongation percent in 3 inches	27.08 %	29.17 %	27.08 %	28.12 %
Reduction of area percent	47.37 %	49.08 %	45.15 %	50.32 %

Small pieces from each portion were treated as described below, and were subjected to continuous reversals of

fibres stresses in the machine described in a previous paper by the authors.

Resistance to Reversals of Stresses.

SAMPLES FROM CENTRAL AXIS.

	Alternation of 10 Tons Fibre Stress.
Normal	311,400
Reheated to 820° C. and cooled in air	1,506,000
Reheated to 850° C. and cooled in air	2,526,000
Reheated to 870° C., cooled in air, and reheated again to 850° C. and cooled in air	13,532,000

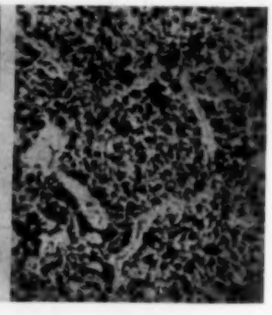
SAMPLES FROM UNDER WHEEL SEATING.

Normal	(*b*)208,000 (*a*)616,000
Reheated to 820° C. and cooled in air	1,052,000
Reheated to 850° C. and cooled in air	13,630,000
Reheated to 870° C., cooled in air, and reheated again to 850° C. and cooled in air	11,630,000 at 19 tons. 2,833,000 at 21 tons.

In each case the pieces of metal reheated did not weigh more than 4 oz., the heating was rapidly effected, and as soon as the desired temperature was reached they were removed from the furnace. It is probable that a longer heating at somewhat lower temperatures would have given equally good results.

In reviewing the known data received from Mr. Holden about this axle, together with the information obtained by

(Fig. 4.)



(Fig. 5.)

FIG. 4.—BURNT STEEL RAIL.
FIG. 5.—BURNT STEEL RAIL AFTER REHEATING TO AND COOLING FROM 850° C.
MAGNIFICATION 50 DIAMETERS.

our own testing, the following observations should be noted, viz.:

(1) The axle stood 20 years before it finally broke. During this period it had traveled probably 300,000 miles, and had been subjected to 200,000,000 reversals of stress.

(2) The flaw which initiated fracture appears to have been a deep stamp mark, clearly seen in the photograph supplied by Mr. Jenkins (Fig. 6).

(3) The weakness produced initially by this deep impression, in our opinion, eventually led to a fatigue fracture, which traveled from the upper to the convex termination of what corresponds with the light part shown in the photograph. Sudden or granular fracture followed through the remaining part of the mass.

(4) The inference is that had there been no such excessively deep stamp impression the axle could not have failed.

(5) According to the fibre stress testing, the normal steel of rather coarse crystalline structure is relatively weak, but, for all that, it is good material, and calculated to be quite strong enough to stand all the normal working stresses.

(6) Proper heat treatment very greatly increases the fatigue-resisting properties of the steel.

(7) That ordinary tensile tests which do not show the yield points fail to give a hint as to the relative value of steels in their power to resist fatigue.

The photomicrographs, Figs. 8 and 9, represent the structure of the steel before and after heating to 870° and 850° C.

Hypothetical Conclusions.

It is impossible to refrain from endeavoring to explain how it is that overheated steel should be so weak and non-resistant to the continued application of reversals of stresses and strains as compared with the same material

FIG 6.—FRACTURED AXLE, MAGNIFIED 1½ DIAMETERS.

in the normal and restored conditions. In doing this the following facts must be taken as bases, viz.:

(1) That in the normal and restored material the crystalline structure is in each case fine, whereas it is coarse in the overheated steels.

(2) That in Series G, H and I the crystal grains of large dimensions in the overheated steels were surrounded by more or less complete envelopes of massive free ferrite, and that in Series I the grains enclosed by these envelopes were cut up by plates or sheets of the same substance.

(3) That on bending the polished and etched specimen of the overheated steel backward and forward it was easily observed under the microscope that the extension or distortion during the bending was mainly confined to the massive ferrite envelopes and sheets. At first they appeared to sink below the surface, and eventually developed

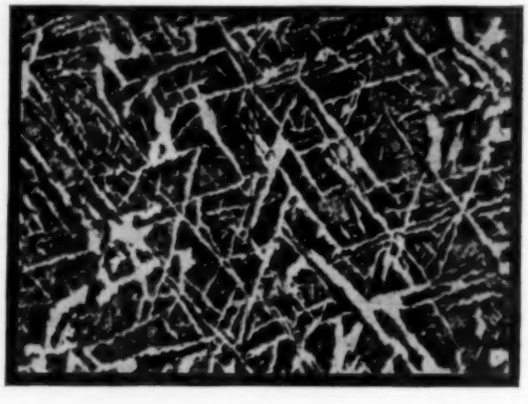


FIG. 7.—PORTION OF BROKEN AXLE; CENTRAL PART OF ONE OF THE LARGER GRAINS. MAGNIFIED 150 DIAMETERS.

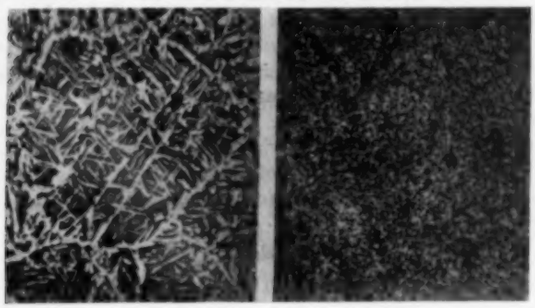
into actual fissures or incipient cracks; an observation confirmed by Mr. Jenkins in the case of the broken axle.

(4) The researches of Prof. Ewing, Messrs. Humfrey, A. E. Seaton and A. Jude have proved that fracture of steel when under the influence of long-continued fatigue or under sudden shock is initiated in the free ferrite, and generally travels continuously as far as possible along a

track in which there is the greatest amount of that constituent.

(5) That in pure or nearly pure commercial carbon steels the ferrite has a yield point of probably not more than 8 to 12 tons per square inch, whereas the other constituent, pearlite, does not sensibly yield until a tension of about twice these amounts is reached, excepting when its structure is composed of broad sheets of ferrite and carbide of iron, for in such case the ferrite behaves as if it were massive, and the yield point is necessarily much lower.

(6) The weakness of a steel under stress in any given direction depends on the manner in which the ferrite and pearlite are arranged with relation to the stresses applied. For instance, in large forgings it not infrequently happens that the ferrite and pearlite are arranged in more or less continuous bands or sheets. If a polished and etched section is bent slightly at right angles to the plane of these, and is then examined, it will be found that the ferrite bands are depressed below the surface, whilst the lines of pearlite remain in relief. On attempting to bend to any great extent, the piece will break at a very poor angle. If, however, bending is effected with the fibre, the steel will bend quite close without fracturing. If such a steel



(Fig. 8.) (Fig. 9.)

FIG. 8.—BROKEN AXLE AFTER HEAT TREATMENT.
FIG. 9.—BROKEN AXLE IN NORMAL STATE.
SECTIONS CUT FROM TEST PIECE AND MAGNIFIED 50 DIAMETERS.

is heated to a sufficient temperature so as to cause the carbon to be regularly diffused through what was originally massive ferrite, and it is then quenched in water and reheated to 650° C., it will bend close equally in each direction, provided that there is a complete absence of strings or plates of sulphide or silicate of manganese.

With these facts before us, it is not difficult to explain the weakness of coarsely crystalline structural steels. The comparatively massive and continuous sheets of ferrite approach more or less nearly to the actual and supposititious cases referred to of ferrite between pearlite. When under stresses which are below the yield point as determined by the testing machine, but which cannot be below that of the ferrite, they are concentrated on these broad bands, movements backward and forward, with each reversal of stress, occur between the particles of the soft ferrite, till eventually incipient fracture is started, and, once begun, it rapidly travels through ferrite and pearlite alike until a complete separation of the mass is effected.

In the case of overheated steels containing above 1 per cent carbon, the brittle envelopes of carbide of iron which surround the grains or which pass through their substance are the places along which fracture most readily travels. Overheated steels consisting entirely of pearlite are very brittle, and probably fracture is initiated in the plates of carbide.

Ingot iron may be made coarse grained and brittle by long-continued heating at temperatures below Ac3—870° C., if the carbon is very low, and if it exceed 0.10, by heating at a very high degree of heat. In either case the steel is weak, and fracture is initiated between the cleavage planes of the ferrite when subjected to stresses and strains. On the other hand, when the crystals are fine and the ferrite exists in minute crystals and are heterogeneously oriented and are intimately distributed with the pearlite throughout the mass, the strength of the two constituents are averaged, the lines of stress pass over a multitude of each of them, and the pearlite being the stronger, supports the ferrite and prevents it breaking down.

If these conclusions are right, it seems obvious that it would be an ideal condition if free ferrite were absent in carburized steels which have to be subjected to severe vibratory stresses. Ordinary structural steels in this condition can be obtained by heating to a suitable temperature, quenching, and reheating at a lower temperature.

Before concluding we wish to emphasize the fact that we do not maintain that steel initially bad, brittle and dangerous, owing to irregularity in the distribution of the elements, or from other causes which have not yet been explained, can be made good by any kind of heat treatment. What we believe has been proved conclusively is that good steels which have been heated to any point short of incipient disintegration, and made excessively brittle by such treatment, can be completely restored to perfectly sound and reliable material. Also, that it is safest to heat to a temperature about 50° above the critical points to insure the complete change of every portion of the steel, excepting in the case of the purest and most homogeneous steels, when the temperature of the upper critical points need not be greatly exceeded.

Cleveland Civil Engineers' Club Visits Conneaut.

By special invitation of the Pittsburg & Conneaut Dock Co., the members of the Civil Engineers' Club, of Cleveland, visited Conneaut Harbor on Saturday, Sept. 30. Through the courtesy of A. W. Johnson, of the Nickel Plate, a special car was placed at the disposal of the club and attached to train No. 6, arriving in Conneaut at 10:57 where the visitors were met by the officers of the Dock Company. After lunch at the Hotel Cleveland, the party was taken to the harbor by a special car on the electric line. First, a general view of the entire equipment was afforded by a trip upon a tug, including a run out in the lake to get a comprehensive view of the harbor and machinery. After the party returned to the harbor, the different machines were inspected in order. A visit was first paid to the Hulett unloaders, after which the Brown electric unloaders were examined. Some of the visitors also climbed onto the bridge crane used for carrying ore to the stock piles. The lower plant, weighing devices and yard were next inspected. A visit to the Hulett coal loading plant completed the inspection of the east side of the harbor. On the west side, the McMyler fast plant was first inspected, after which some of the members went to visit the Conneaut waterworks, while the others inspected the high level bridges on the west side of the harbor. It is of special interest to note that practically the entire equipment at Conneaut was designed and built by members of the club, which includes in its membership the leading mechanical, civil and structural engineers of Cleveland.

Charles M. Schwab is quoted as saying at Denver: "It matters little for many years to come whether foreign countries want our products or not. Our domestic business promises to surpass any period in our history. No matter what tariff is raised against us, the resources of this country, the probable increase in population, and the consequent increase in home consumption will make us wholly independent of foreign markets for decades to come."

ADOPTIONS OF STANDARD SPECIFICATIONS BY THE AMERICAN SOCIETY FOR TESTING MATERIALS.

The American Society for Testing Materials recently submitted to a letter ballot the proposed standard specifications for structural steel for bridges, for steel castings, for steel axles, for steel forgings, for cast iron car wheels, and for gray iron castings.

The specifications as approved by the convention last May at Atlantic City were all adopted by a large majority. The amendment to the constitution, making the membership in the International Association for Testing Materials independent of the membership in the American Society for Testing Materials was also adopted by a vote of 86 to 1.

A number of changes have been made in the specifications as first published a year ago, and the specifications as finally approved by the letter ballot will be printed in the present and immediately following issues of *The Iron Trade Review*. In this issue the specifications for steel forgings, and for cast iron car wheels follow.

Standard Specifications for Cast-Iron Car Wheels.

Chemical Properties.

The wheels furnished under this specification must be made from the best materials, and in accordance with the best foundry methods. The following pattern analysis is given for information, as representing the chemical properties of a good cast-iron wheel. Successful wheels, varying in some of the constituents quite considerably from the figures given, may be made:

Total carbon	3.50	percent.
Graphitic carbon	2.90	"
Combined carbon	0.60	"
Silicon	0.70	"
Manganese	0.40	"
Phosphorus	0.50	"
Sulphur	0.08	"

1. Wheels will be inspected and tested at the place of manufacture.

2. All wheels must conform in general design and in measurements to drawings, which will be furnished, and any departure from the standard drawing must be by special permission in writing, and manufacturers wishing to deviate from the standard dimensions must submit duplicate drawings showing the proposed changes, which must be approved.

Drop Tests.

3. The following table gives data as to weight and tests of various kinds of wheels for different kinds of cars and service:

Wheel	33-in. diameter Frgt. and Pass. cars.			36-in. diameter.	
Kind of service	60,000 lbs. capacity and less.	70,000 lbs. capacity.	100,000 lbs. capacity.	Passenger Cars.	Locomotive Tenders.
Number	1	2	3	4	5
Weight Desired	600	650	700	700 lbs.	750 lbs.
Weight Variation		Two percent either way.			
Height of drop, ft.	9	12	12	12	12
Number of blows	10	10	12	12	14

Marking.

4. Each wheel must have plainly cast on the outside plate the name of the maker and place of manufacture. Each wheel must also have cast on the inside double plate the date of casting and a serial foundry number. The manufacturer must also provide for the guarantee mark, if so required by the contract. No wheel bearing a duplicate number, or a number which has once been passed upon, will be considered. Numbers of wheels once rejected will remain unfilled. No wheel bearing an indistinct number or date, or any evidence of an altered or defaced number will be considered.

Measures.

5. All wheels offered for inspection must have been measured with a standard tape measure and must have the shrinkage number stenciled in plain figures on the inside of the wheel. The standard tape measure must correspond in form and construction to the "Wheel Circumference Measure" established by the Master Car Builders' Association in 1900. The nomenclature of that measure need not, however, be followed, it being sufficient if the graduating marks indicating tape sizes are one-eighth of an inch apart. Any convenient method of showing the shrinkage or stencil number may be employed. Experience shows that standard tape measures elongate a little with use, and it is essential to have them frequently compared and rectified. When ready for inspection, the wheels must be arranged in rows according to shrinkage numbers, all wheels of the same date being grouped together. Wheels bearing dates more than 30 days prior to the date of inspection will not be accepted for test, except by permission. For any single inspection and test only wheels having three consecutive shrinkage or stencil numbers will be considered. The manufacturer will, of course, decide what three shrinkage or stencil numbers he will submit in any given lot of 103 wheels offered, and the same three shrinkage or stencil numbers need not be offered each time.

Finish.

6. The body of the wheels must be smooth and free from slag and blowholes, and the hubs must be solid. Wheels will not be rejected because of drawing around the center core. The tread and throat of the wheels must be smooth, free from deep and irregular wrinkles, slag, sand wash, chill cracks or swollen rims, and be free from any evidence of hollow rims, and the throat and thread must be practically free from sweat.

Material and Chill.

7. Wheels tested must show soft, clean, gray iron, free from defects, such as holes containing slag or dirt more than one-quarter of an inch in diameter, or clusters of such holes, honeycombing of iron in the hub, white iron in the plates or hub, or clear white iron around the anchors of chaplets at a greater distance than one-half of an inch in any direction. The depth of the clear white iron must not exceed seven-eighths of an inch at the throat and 1 in. at the middle of the tread, nor must it be less than three-eighths of an inch at the throat or any part of the tread. The blending of the white iron with the gray iron behind must be without any distinct line of demarcation, and the iron must not have a mottled appearance in any part of the wheel at a greater distance than 1⅝ in. from the tread or throat. The depth of chill will be determined by inspection of the three test wheels described below, all test wheels being broken for this purpose, if necessary. If one only of the three test wheels fails in limits of chill, all the lot under test of the same shrinkage or stencil number will be rejected and the test will be regarded as finished so far as this lot of 103 wheels is concerned. The manufacturer may, however, offer the wheels of the other two shrinkage or stencil numbers, provided they are acceptable in other respects as constit-

uents of another 103 wheels for a subsequent test. If two of the three test wheels fail in limits of chill, the wheels in the lot of 103 of the same shrinkage or stencil number as these two wheels will be rejected, and, as before, the test will be regarded as finished so far as this lot of 103 wheels is concerned. The manufacturer may, however, offer the wheels of the third shrinkage or stencil number, provided they are acceptable in other respects, as constituents of another 103 wheels for a subsequent test. If all three test wheels fail in limits of chill, of course the whole hundred will be rejected.

Inspection and Shipping.

8. The manufacturer must notify when he is ready to ship not less than 100 wheels; must await the arrival of the inspector; must have a car, or cars, ready to be loaded with the wheels, and must furnish facilities and labor to enable the inspector to inspect, test, load and ship the wheels promptly. Wheels offered for inspection must not be covered with any substance which will hide defects.

9. A hundred or more wheels being ready for test, the inspector will make a list of the wheel numbers, at the same time examining each wheel for defects. Any wheels which fail to conform to specifications by reason of defects must be laid aside, and such wheels will not be accepted for shipment. As individual wheels are rejected, others of the proper shrinkage, or stencil number, may be offered to keep the number good.

Retaping.

10. The inspector will retape not less than 10 percent of the wheels offered for test, and if he finds any showing wrong tape-marking, he will tape the whole lot and require them to be restenciled, at the same time having the old stencil marks obliterated. He will weigh and make check measurements of at least 10 percent of the wheels offered for test, and if any of these wheels fail to conform to the specification, he will weigh and measure the whole lot, refusing to accept for shipment any wheels which fail in these respects.

Drop Tests.

11. Experience indicates that wheels with higher shrinkage or lower stencil numbers are more apt to fail on thermal test, more apt to fail on drop test, and more apt to exceed the maximum allowable chill than those with higher stencil or lower shrinkage numbers; while, on the other hand, wheels with higher stencil or lower shrinkage numbers are more apt to be deficient in chill. For each 103 wheels apparently acceptable, the inspector will select three wheels for test—one from each of the three shrinkage or stencil numbers offered. One of these wheels chosen for this purpose by the inspector must be tested by drop test as follows: The wheel must be placed flange downward in an anvil block weighing not less than 1,700 lb., set on rubble masonry 2 ft. deep and having three supports not more than 5 in. wide for the flange of the wheel to rest on. It must be struck centrally upon the hub by a weight of 200 lb., falling from a height as shown in the table on page 1. The end of the falling weight must be flat, so as to strike fairly on the hub, and when by wear the bottom of the weight assumes a round or conical form, it must be replaced. The machine for making this test is shown on drawings which will be furnished. Should the wheel stand without breaking in two or more pieces, the number of blows, shown in the above table, the 100 wheels represented by it will be considered satisfactory as to this test. Should it fail, the whole hundred will be rejected.

Thermal Test.

12. The other two test wheels must be tested as follows: The wheels must be laid flange down in the sand, and a channelway 1¼ in. in width at the center of the tread and 4 in. deep must be molded with green sand around the wheel. The clean tread of the wheel must form one side of this channelway, and the clean flange must form as much of the bottom as its width will cover. The channelway must then be filled to the top from one ladle with molten cast iron, which must be poured directly into the channelway without previous cooling or stirring, and this iron must be so hot, when poured, that the ring which is formed when the metal is cold shall be solid or free from wrinkles or layers. Iron at this temperature will usually cut a hole at the point of impact with the flange. In order to avoid spitting during the pouring, the tread and inside of the flange during the thermal test should be covered with a coat of shellac; wheels which are wet or which have been exposed to snow or frost may be warmed sufficiently to dry them or remove the frost before testing, but under no circumstances must the thermal test be applied to a wheel that in any part feels warm to the hand. The time when pouring ceases must be noted, and two minutes later an examination of the wheel under test must be made. If the wheel is found broken in pieces, or if any crack in the plates extends through or into the tread, the test wheel will be regarded as having failed. If both wheels stand the whole hundred will be accepted as to this test. If both fail, the whole hundred will be rejected. If one only of the thermal test wheels fails, all of the lot under test of the same shrinkage or stencil number will be rejected, and the test will be regarded as finished, so far as this lot of wheels is concerned. The manufacturer may, however, offer the wheels of the other two shrinkage or stencil numbers, provided they are acceptable in other respects, as constituents of another 103 wheels for a subsequent test.

Storing and Shipping.

13. All wheels which pass inspection and test will be regarded as accepted, and may be either shipped or stored for future shipment, as arranged. It is desired that shipments should be, as far as possible, in lots of 100 wheels. In all cases the inspector must witness the shipment, and he must give, in his report, the numbers of all wheels inspected and the disposition made of them.

Rejections.

14. Individual wheels will be considered to have failed and will not be accepted or further considered, which,

First. Do not conform to standard design and measurement.

Second. Are under or over weight.

Third. Have the physical defects described in Section 6.

15. Each 103 wheels submitted for test will be considered to have failed and will not be accepted or considered further, if,

First. The test wheels do not conform to Section 7, especially as to limits of white iron in the throat and tread and around chaplets.

Second. One of the test wheels does not stand the drop test as described in Section 11.

Third. Both of the two test wheels do not stand the thermal test as described in Section 12.

Standard Specifications for Steel Forgings.

Manufacture and Chemical Properties.

1. Steel for forgings may be made by the open-hearth, crucible or Bessemer process.

2. There will be four classes of steel forgings which

shall conform to the following limits in chemical composition.

	Forgings of Soft or Low Carbon Steel.	Forgings of Carbon Steel not Annealed.	Forgings of Carbon Steel, Oil Tempered or Annealed.	Locomotive Forgings	Forgings of Nickel Steel, Oil Tempered or Annealed.
Phosphorus shall not exceed	0.10%	0.06%	0.04%	0.05%	0.04%
Sulphur " " "	0.10%	0.06%	0.04%	0.05%	0.04%
Manganese " " "	.....	.....	....	0.60%	.....
Nickel " " "	.....	.....	.....	.....	3.0 to 4.0

Physical Properties.

3. The minimum physical qualities required of the different sized forgings of each class shall be as follows:

	Pounds Per Square Inch		Percent	
	Tensile Strength	Yield Point	Elongation in 2 Inches	Contraction of Area
SOFT STEEL OR LOW CARBON STEEL.				
For solid or hollow forgings, no diameter or thickness of section to exceed 10"	58,000	29,000	28	35
CARBON STEEL NOT ANNEALED.				
For solid or hollow forgings, no diameter or thickness of section to exceed 10"	75,000	37,500	18	30
CARBON STEEL ANNEALED.		Elastic Limit		
For solid or hollow forgings, no diameter or thickness of section to exceed 10"	80,000	40,000	22	35
For solid forgings, no diameter to exceed 20" or thickness of section 15"	75,000	37,500	23	35
For solid forgings, over 20" diameter	70,000	35,000	24	30
CARBON STEEL, OIL TEMPERED.				
For solid or hollow forgings, no diameter or thickness of section to exceed 3"	90,000	55,000	20	45
For solid forgings of rectangular sections not exceeding 6" in thickness or hollow forgings, the walls of which do not exceed 6" in thickness	85,000	50,000	22	45
For solid forgings of rectangular sections not exceeding 10" in thickness or hollow forgings, the walls of which do not exceed 10" in thickness	80,000	45,000	23	40
LOCOMOTIVE FORGINGS.	80,000	40,000	20	25
NICKEL STEEL ANNEALED.				
For solid or hollow forgings, no diameter or thickness of section to exceed 10"	80,000	50,000	25	45
For solid forgings, no diameter to exceed 20" or thickness of section 15"	80,000	45,000	25	45
For solid forgings, over 20" diameter	80,000	45,000	24	40
NICKEL STEEL, OIL TEMPERED.				
For solid or hollow forgings, no diameter or thickness of section to exceed 3"	95,000	65,000	21	50
For solid forgings of rectangular sections not exceeding 6" in thickness or hollow forgings, the walls of which do not exceed 6" in thickness	90,000	60,000	22	50
For solid forgings of rectangular sections not exceeding 10" in thickness or hollow forgings, the walls of which do not exceed 10" in thickness	85,000	55,000	24	45

Bending Test.

4. A specimen one inch by one-half inch (1" x ½") shall bend cold 180° without fracture on outside of bent portion, as follows:

Around a diameter of ½ in., for forgings of soft steel,

Around a diameter of 1½ in., for forgings of carbon steel not annealed,

Around a diameter of 1½ in., for forgings of carbon steel annealed, if 20 in. in diameter or over,

Around a diameter of 1 in., for forgings of carbon steel annealed, if under 20 in. diameter,

Around a diameter of 1 in. for forgings of carbon steel oil-tempered,

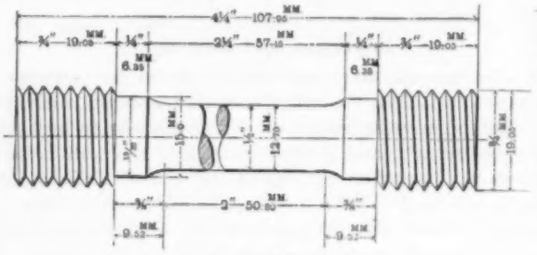
Around a diameter of ½ in., for forgings of nickel steel annealed,

Around a diameter of 1 in., for forgings of nickel steel oil-tempered.

Test Pieces and Methods of Testing.

For locomotive forgings no bending test will be required.

5. The standard turned test specimen, one-half inch (½") diameter and two inch (2") gauged length, shall be used to determine the physical properties specified in paragraph No. 3. It is shown in the following sketch.



TEST-PIECE.

Number and Location of Tensile Specimens.

6. The number and location of test specimens to be taken from a melt, blow, or a forging shall depend upon its character and importance and must therefore be regulated by individual cases. The test specimens shall be cut cold from the forging or full-sized prolongation of same parallel to the axis of the forging and half way between the center and outside, the specimens to be longitudinal, i. e., the length of the specimen to correspond with the direction in which the metal is most drawn out or worked. When forgings have large ends or collars, the test specimens shall be taken from a prolongation of the same diameter or section as that of the forging back of the large end or collar. In the case of hollow shafting, either forged or bored, the specimen shall be taken within the finished section prolonged, half way between the inner and outer surface of the wall of the forging.

Test Specimen for Bending.

7. The specimen for bending test one inch by one-half inch (1" x ½") shall be cut as specified in paragraph No. 6. The bending test may be made by pressure or by blows.

Yield Point and Elastic Limit.

8. The yield point specified in paragraph No. 3 shall be determined by the careful observation of the drop of the beam, or halt in the gauge of the testing machine.

9. The elastic limit specified in paragraph No. 3 shall be determined by means of an extensometer, which is to be attached to the test specimen in such manner as to show the change in rate of extension under uniform rate of loading, and will be taken at that point where the proportionality changes.

Sample for Chemical Analysis.

10. Turnings from the tensile specimen or drillings from the bending specimen or drillings from the small test ingot, if preferred by the inspector, shall be used to determine whether or not the steel is within the limits in chemical composition specified in paragraph No. 2.

Finish.

11. Forgings shall be free from cracks, flaws, seams or other injurious imperfections, and shall conform to dimensions shown on drawings furnished by the purchaser, and be made and finished in a workmanlike manner.

Inspection.

12. The inspector representing the purchaser shall have all reasonable facilities afforded to him by the manufacturer to satisfy him that the finished material is furnished in accordance with these specifications. All tests and inspections shall be made at the place of manufacture, prior to shipment.

RAILWAY IMPROVEMENTS

Under Way in Canada May Force Revision of the Tariff.

TORONTO, CANADA, Oct. 7, 1905.—The investigations now in progress by the Tariff Commission in order to ascertain the feeling of the country with regard to a thorough revision of the tariff on imports at the next session of the Canadian Parliament are creating a renewed interest in the subject, and the next few months will undoubtedly witness a vigorous campaign for increased protective duties. A feature of the situation which will exercise an important influence is the vastly increased present and prospective demand for iron and steel manufactures, which is being largely supplied by importation. As has been previously pointed out the principal factor for some years to come in the conditions of the trade is the enormous development and extension of the Canadian railroad system. The following is an approximate detailed statement of the extensions now undertaken which have to be completed in from three to five years from date. Grading contracts have already been let covering about 75 percent of the total mileage of 7,240 miles, and the remainder will be put under contract so soon as the surveys are completed.

	Miles.	Cost.
CANADIAN PACIFIC.		
Toronto to Sudbury	250	$7,000,000
Fort William to Winnipeg, double track.	425	8,000,000
Guelph to Goderich	80	2,000,000
Midland to Peterboro'	130	5,000,000
Battleford Branch	225	5,000,000
Pleasant Hill Branch	210	4,200,000
Lacombe Branch	110	2,200,000
Wetaskawin Branch	114	2,250,000
Extension of Branch Lines	300	6,000,000
CANADIAN NORTHERN.		
To Edmonton, Main Line	550	11,000,000
Extension of branches building	330	7,000,000
Regina Branch	200	4,000,000
Parry Sound to North Bay	200	7,000,000
GRAND TRUNK PACIFIC.		
Lake Superior Division	220	6,600,000
Prairie Division	1000	20,000,000
Mountain Pacific Division	700	25,000,000
Main Line, East	1800	50,000,000
GRAND TRUNK.		
Double tracking	200	4,000,000
NORTHERN PACIFIC.		
Vancouver & Eastern	300	9,000,000
TORONTO TO NIAGARA (ELECTRIC).		
Double track	100	4,000,000
Total	7,240	$182,250,000

The standard 80-lb rail will be put down on these roads, and it is estimated that a total approximating 1,200,000 tons will be needed for this work during the next four years, together with 400,000 tons of small sections for car and locomotive building, switches, trestles and bridges. The cost of equipping the lines when built is placed at $75,000,000, which, with the cost of road construction, makes a grand total of over $250,000,000. During the coming year Canadian railways will require over 100,000 tons of bridge material for renewing and strengthening bridges. The requirements of the Grank Trunk railway alone for this purpose will amount to 30,000 tons.

The trade and navigation returns, covering the fiscal year ended June 30, show the extent of the importations of small steel, which has to be brought in in the face of a duty of from $7 to $10 per ton. The imports for the year of bar iron and steel, comprising only rounds, squares and flats, amounted to 32,375 tons, valued at $1,024,256, on which duties amounting to $202,634 were exacted. Fish plates were brought in to the extent of nearly 7,000 tons under a duty of $8 per ton, the value of the goods being $208,246. There are several small plate mills in Canada manufacturing butt-welded pipe up to two inches in diameter. All the skelp for this industry is imported to the amount of 19,147 tons, valued at $557,944. Railroad spikes pay a duty of $10 per ton, and nearly 25,000 tons came from abroad, costing $97,221, with duties amounting to $24,839.

Canada has no tin-plate industry as yet, though several projects to establish this branch of manufacture have been set on foot. Last year the importations in this line amounted, roughly speaking, to 250,000 boxes, including black plate produced at a tin-plate mill, valued at $2,879,600. To supply this demand here would require a 20-mill plant and give employment to 2,000 men.

These considerations, coupled with the certainty of a vastly increased market as the result of railway construction, the rapid settlement of the West and the general industrial expansion are bringing the tariff question prominently to the front, and if conditions remain unchanged the next few years will see a very large proportion of the money so lavishly expended on railroad and other construction work sent out of the country for the purchase of materials.

MANY OBSTACLES

In the way of Using Black Sands of the West in Blast Furnace Practice.

Editor *The Iron Trade Review:*

Sir: The notes on "Iron Sands in the West," by Dr. David T. Day, in your issue of Sept. 28, seem to call for a few more remarks from those who are familiar with the subject. My examination of a number of black sand deposits has shown that these sands in the West are generally derived from the disintegration of more or less basic eruptive rocks, such as basalts, gabbros, serpentines, diorites, etc. The magnetic iron minerals from these rocks are commonly a mixture of ilmenite and magnetite; and the concentrated black sands carry from 1 percent to 30 percent of titanic acid. Physically and chemically the black sands are not very desirable material for use in the blast furnace, even aside from their titanic acid content. Rounded and polished by stream and wave action, the grains have no coherence one to another, and a large percentage will pass an 80-mesh screen. They are somewhat difficult of separation from the garnets, staurolites, and other heavy silicates mingled with them; and after comparatively clean separation would probably require roasting and briquetting before they could be used in a blast furnace. The product even then would not be uniform in composition nor in percentage of metallic iron, and the resulting pig would not have a constant grade.

Added to these disadvantages, are the uncertain extent of the deposits and the extremely variant amount of gray sand mixed with and often resting upon the black sand, the lack of suitable ores for furnace mixtures, and the uncertainty of transportation facilities. The latter item alone would, in many instances, amount to the "dollar per ton" at which Dr. Day estimates the ore could "be laid down at a furnace."

With full appreciation of the opportunity for the establishment of an iron and steel industry on the Pacific Coast, I have made personal examination of a large number of iron ore properties up and down the coast from Alaska to Mexico and in the interior, and have considered the black sands in this connection. And, while entertaining the greatest possible respect for the attainments of Dr. Day, and for any opinion that he might express, I must say that my investigations have led me to conclude that the iron sands do not promise to afford a supply of desirable iron ore in the West. Yours truly,

HORACE V. WINCHELL.

Butte, Mont., Oct. 3, 1905.

BRITISH PRICES ADVANCE.

Heavy Demand Continues—Concerns Report Enormous Profits.

(Special Correspondence.)

BIRMINGHAM, ENGLAND, Oct. 1.—Writing on the iron trade just now is very much a matter of registering advances. Several more have to be recorded this week. Most branches of the finished iron trade gave a lead to the unmarked bar department, but this has now followed suit. There was a meeting held on the last market day in Birmingham, when it was decided to put up prices from £6 to £6 5s. The gathering was a very representative one, presided over by Mr. Ebenezer Parkes, M. P., and will probably precede the formal rescusitation of the Unmarked Bar Association, which has been in suspense for about three years. It is significant that, though the so-called "standard" has continued for some years at £6, any number of transactions have taken place at £5 12s 6d. Within the past few weeks prices have crept up to £6, and in a few cases as much as £6 7s 6d has been secured. Bar makers want the improvement badly, for with high wages, dear materials, and terribly cutting prices, they have been badly hit.

Owing to dear pig iron, the Iron Founders' Association, of South Staffordshire, has decided to add 5s to the price of heavy castings, or about 2½ percent. A very good demand for new rolls and mill requisites generally has now set in and works are doing much better. This is the first advance for several years. The second advance of 5 percent in three weeks has been declared in galvanized hollow-ware, and another addition of 5s has been made to galvanized corrugated sheets, making the figure £11 5s. But it is well known that makers are easily getting 5s, and in some cases 10s above this minimum. This rise is partly due to the price of spelter, which now stands at £26 10s, representing £3 above this year's lowest figure and adding about 17s 6d to the cost of a ton of sheets. Orders continue to pour in for this description of iron at a remarkable rate.

Good Profits Are Shown.

Further encouraging reports have been issued by leading firms. Armstrong Whitworth, of Newcastle-on-Tyne, for example, has a profit of £580,928, from which is paid a dividend of 15 percent, applying £137,120 to the extinction of goodwill and carrying forward £84,033. In the renewal of plant the firm has spent £150,000. Palmer's Shipbuilding, of Newcastle-on-Tyne reports an increase in its profits of £26,600, from which it pays 5 percent dividend and carries forward £14,900. This firm has spent £8,900 on extensions. The Sheepbridge Coal & Iron Co., Chesterfield, reports a shrinkage of profits amounting to £12,000, but is able to pay the usual dividend of 7½ percent on ordinary shares and 5 percent on the preference.

News comes from Vienna that the large English shipbuilding company of Messrs. Swan, Hunter, Wigham & Richardson, of Newcastle-on-Tyne, is arranging to purchase the greater part of the shipbuilding yard of the Austrian Lloyd at Trieste. The purchase is to be completed after the conclusion of a new contract between Lloyd's and the Austrian authorities. This is one of the firms at present engaged in the building of the latest Cunarders, the other firm sharing the work being Messrs. John Brown & Co., Clydebank. These vessels will be the largest in the world, having a length of 785 ft. and a carrying capacity of 30,000 tons.

Various steel works on the northeast coast have within the past few days received inquiries for 50,000 tons of steel rails, of which 20,000 tons are for a South American railway. Certain Scottish firms are so well off for work that they are unable to tender. More pig iron orders are also being placed for America, one inquiry representing 30,000 tons of hematite for delivery in the early part of next year.

SHOPS FOR ALL STEEL PASSENGER CARS.

New Plant at Berwick, Pa., Will Turn Out Steel Bodied Fire-Proof Coaches.

An extensive manufacturing plant devoted exclusively to the construction of fireproof steel passenger cars suggests the beginning of the end of the wooden, fragile, inflammable coach in railway transportation. The new shops of the American Car & Foundry Co., at Berwick, Pa., will have a capacity of 50 steel passenger cars per month. The foundations of the main structure are already laid and the walls are well up.

The main erecting shop will be 1,000 ft. long by 200 ft. wide, and will be fitted with electric traveling cranes, etc. A second building, 500 ft. by 150 ft., will be employed for the preparation of the steel. The buildings will be of steel and brick, and the most improved appliances for electric transmission of power and handling material will be employed.

"The capacity will depend somewhat upon the style of the cars produced; it will vary from 50 to 100 per month," said an officer of the company. "We hope to have the

AN ALL-STEEL CAR FOR THE LONDON SUBWAY.

shops in operation at the beginning of the year, but," he added, "all of our orders will not be kept waiting so long. We are already turning out steel passenger cars in quantity. We have built and have upon our books orders for more than 1,000 steel passenger cars, and we are building a plant to take care of this business. From the character of orders and inquiries received, it appears that the passenger coach is passing through the same process of evolution which transformed the old freight car into an elastic, almost indestructible unit.

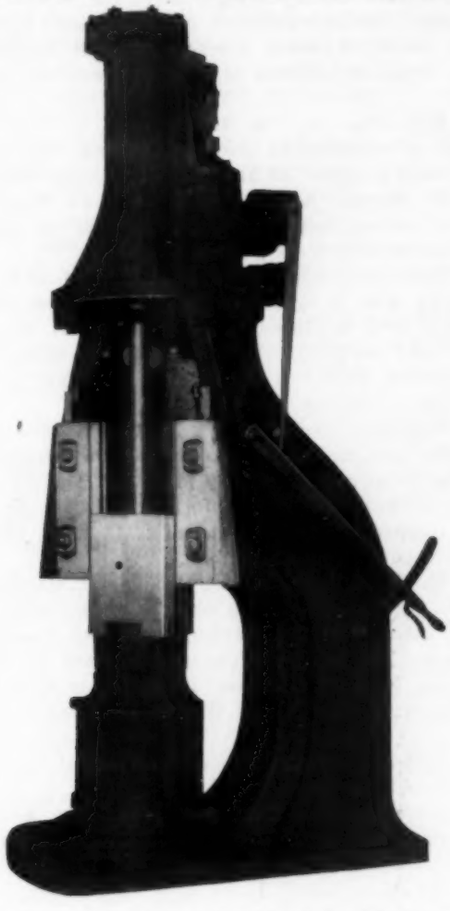
"The element of safety is going to be the determining factor. A car which will not splinter into a thousand pieces and catch fire when subjected to an unusual strain is something which the public will soon demand and insist upon. Seventy-five percent of the lives lost in railroad accidents would not be sacrificed if the almost inevitable fire were not added to the sum of disaster. The new style of car is absolutely fireproof.

"The form or design of the all-steel passenger car is still in process of development. It is now largely a question of weight and cost. How to reduce the quantity of metal required without sacrificing strength, capacity or beauty is the problem. Experience has already brought about great improvement in this direction."

The illustration shows one of a lot of 275 steel cars being built by the company for the Yerkes transportation system in London for use in the "Tuppenny Tube," the subway of the British metropolis.

A STEAM HAMMER WITH REINFORCED GUIDES AND STIFFENED COLUMN.

The David Bell Engineering Works, Buffalo, N. Y., have recently developed and brought out the steam hammer shown in the accompanying illustration. This hammer contains two new features to which the maker desires to call particular attention. These features are the reinforced guides and the stiffened column. The reinforced guides consist of making the main casting at the point to which the lower end of the slides are bolted, fully 50 percent stronger and heavier than in previous types of hammers. The strength of the casting is also greatly increased by the addition of a vertical flange on the cross web, tying the lower ends of the slide faces



STEAM HAMMER WITH REINFORCED GUIDES AND STIFFENED COLUMN.

together in the main casting. This overcomes a weak point in this type of hammer and puts strengthening material at the point where it is most needed. The stiffened column consists of adding to the pattern, and casting solid on the column of the main frame, a heavy band or web extending from around the bottom of the slides down each side of the column to the bed plate. This web joins in the bed plate with the heavy ring around the die-block opening. The web adds greatly to the resistance to shearing at any point in the column.

The hammer is double acting, taking steam at the top and bottom of the stroke through steam ports which are arranged to give a maximum force of blow, the blow, however, being under perfect control and easily regulated and the force varied as desired. The operation may be continuously sustained automatically, with sensitive regulation by the throttle valve. The throttle valve can be connected with the foot treadle, saving the service of helper when it is desired to operate the hammer automatically.

The valve motion is free from all shock or jar of the blow, and requires no attention except the proper lubrication.

The main frame casting is made from a pattern without cores, except the column core, giving uniformity in thickness and shape of the metal. The bed plate is cast in one piece, solid with the frame, with heavy ribs below the floor line.

The cylinder casting is in one piece, with the piston and throttle valve chests, and has an extra heavy flange on the top and bottom, these flanges being reinforced by heavy vertical ribs. The cylinder is dowel pinned and through bolted to the frame with fitted bolts in reamed holes. The working valve is of the balanced piston type and works in a removable bushing. The throttle valve is of a circular form and ground to its seat.

The hammer head is of hammered steel, forged in one piece with the piston rod. The head is set at the proper angle in the main frame casting, so as to permit the drawing and finishing of work either way of the dies without interfering with the column. The head has gang milled "V" grooves which work in adjustable "V" slides, also gang milled. The slides are of heavy construction and are through bolted to the main frame with spring washers on the bolts, and are fitted against the taper gib extending the entire length. They are arranged for independent adjustment.

The die-block is in two pieces, with the top cap above the bed plate. The cap can be easily removed when more space is required for special shape work, upsetting, etc. The lower die-block is made very heavy to absorb the force of the blow and extends below the bed plate, from which the die-block is entirely independent. No strain is put on the bed plate from hammering.

The hammers are made in various sizes, the weights of falling parts varying from 350 to 2,000 lb.

Dodge-Haley Co., Boston.

Among the largest jobbing houses in the iron, steel and heavy hardware business in the East is the above well-known firm. Established in 1840, it has always been one of the leaders in this line. In January, 1905, the firm was merged into a corporation under the laws of Massachusetts, and the policy that has been so successful in the past will still continue. The officers of the corporation are all veterans, having been many years in charge of the affairs of the old house. Mr. Wm. H. Haley, the president, can rightly claim to be the nestor of the iron business in New England, having been in active business over 50 years, and is still active. Mr. Hayward C. Dodge, the treasurer, has been more than 35 years with the old house. Mr. Frank A. Marvin, the vice president and general manager, has had 30 years' experience with the house, and Mr. Chas. A. Haines, the secretary, can also claim continuous service of 35 years.

The corporation, like most Boston houses, makes a specialty of the Swedish iron business, and at all times carries a large stock. Mr. Chas. A. Haines, the secretary, has charge of this particular branch, and is well known to the large Western buyers whom he has called on for some years past. The large building Nos. 153 to 169 Broad street and 212 to 218 Hegle street, Boston, is occupied by the company, and is especially adapted to the business, having been built for it. The building is conveniently located and can be reached from the North or South stations by elevated or surface lines passing directly by it. A cordial invitation is extended to all dealers and others to call when in Boston.

NEWS FROM MANY INDUSTRIES.

New Buyers :—

The Webber Iron Works, Birmingham, Ala., has been incorporated with $10,000 capital stock.

The Monolith Steel Co., Alexandria, Tenn., has been incorporated with $250,000 capital stock to deal in iron, steel and other metals.

The Page Boiler Co., Chicago, has been incorporated to manufacture boilers and tanks. The incorporators are: Edward J. Queeney, J. H. Hopkins and J. J. Wright.

The Metal Products Co., Seattle, Wash., has been incorporated with a capital of $3,000,000 by A. O. Ingalls, F. Myers and Warren Hauser.

The Wellston Steel & Iron Co., Wellston, O., has been incorporated with a capital of $1,000,000. The incorporators are Morris L. Sternberger, J. H. Ferree, H. S. Willard, H. S. Willard Jr. and Joseph McGee.

The Wabash Foundry & Machine Co., Wabash, Ind., has been incorporated with a capital of $25,000. The directors are: Thomas McNanee, Thomas K. King and James I. Robertson.

The Economy Heater & Radiator Co., Sharon, Pa., has been incorporated with $5,000 capital. The directors are: Edward J. Angline, Charles A. Brennan, M. Ray Wildman, Alice M. Wildman and Anna G. Brennan, Sharon.

The Columbia Wire Cordage Co., Boston, has been incorporated with a capital of $10,000. The officers are: President and treasurer, William M. Newcomb, Medford, Mass.; clerk, Joseph P. Dorman, 95 Milk street, Boston.

The Pollock Automatic Wrench Co., Galesburg, Ill., has been incorporated with $25,000 capital stock to manufacture an automatic wrench on which Charles V. Pollock has secured a patent. The incorporators are: J. J. Welsh, E. B. Hardy and Charles V. Pollock.

H. G. Pape Electric & Mfg. Co., Buffalo, N. Y., has been incorporated with a capital stock of $200,000 to manufacture electric equipment, etc. The incorporators are: Herman C. and Ida B. Pape, No. 2172 Amsterdam avenue, and William A. Peters, No. 508 West 168 street, all of New York.

The U. S. Grate Bar Co., No. 68 Broad street, Elizabeth, N. J., has secured articles of incorporation to manufacture machinery, deal in iron, iron ore, etc. The capital stock is $50,000, and the incorporators are: John Griffin, William E. Brown and Frank J. Pfaff, all of Elizabeth, N. J.

The Giant Construction Co., New York city, has been incorporated to deal in structural iron and steel work. The capital is $100,000, and the incorporators are: Jesse P. Larrimer, 64 East 125th street; Frederick A. Bunn and Louis W. Groat, 220 Broadway, all of New York.

The Raquette Foundry & Supply Co., Pottsdam, N. Y., has been incorporated to conduct a brass and iron foundry business with a capital of $5,000. The incorporators are: George D. Huntington and G. S. Knowlton, Waterford, N. Y.; Alexander R. O'Neill, Pottsdam, N. Y.

The Steel & Hollow Block Building & Construction Co., New York, has been incorporated to manufacture artificial stone, with a capitalization of $100,000. The incorporators are: S. Giletti, 1608 Amsterdam avenue; J. H. Tafft and H. R. Wade, 27 Williams street, all of New York.

The Lynn Tube Trolley Track Co., Springfield, Mass., has been incorporated to deal in hardware specialties. The capital stock is $40,000. The officers are: Robert Lynn, president; Herbert J. Lynn, treasurer; Frank E. Holley, 79 Catherine street, clerk.

The Greenhale Gas Engine Co., Worcester, Mass., has been incorporated to deal in gas and gasoline engines, with a capital stock of $15,000. The officers are: President, Harris Burlingame, Worcester, Mass.; treasurer, Sheldon F. Burlingame; clerk, Carl E. Burlingame, both of 416 Boylston street, Worcester, Mass.

The American Locomotive Automobile Co., Schenectady, N. Y., has been incorporated to manufacture automobiles, etc., with a capital of $300,000. The incorporators are: Gilbert H. Montague, 215 West Twenty-third street; George H. Tower, 12 West Forty-fourth street; William A. Parker, 515 Lexington avenue, all of New York.

The Press of Orion, New York, has been incorporated to manufacture tools, printing presses, etc., with a capital of $30,000. The incorporators are: C. Daniel Helm, 111 Nassau street; Leonard Fischer, 32 East Twenty-fifth street; Edgar M. Atkin, 55 Duane street, all of New York.

The Esco Mfg. Co., The Bronx, N. Y., has been incorporated to manufacture parts of motors, vehicles and cycles, with a capital of $10,000. The incorporators are: Frank N. Stevens, Rutherford, N. J.; Louis Schwab, 134 Milford avenue, Newark, N. J.; Salvator Scognamillo, 294 Pleasant avenue, New York.

The National Screw Co. has been incorporated to deal in screws with a capital of $50,000. The officers are: President, Fred B. Oliver, 434 Williams street, New London, Conn.; treasurer, Alfred H. Luce, 59 Maple street, Northampton, Mass.; clerk, George M. Faulkner, 71 Chestnut street, Cambridge, Mass.

The Tallerday Steel Pipe & Tank Co., Waterloo, Iowa, has filed amendments to its articles of incorporation changing its name to the Kelly Mfg. Co. The old officers of the company will remain for the present, the affairs of the company being in charge of C. D. Kern, vice president and G. N. Cousins, secretary.

The M. W. Kellogg Co., 243 Washington street, Jersey City, N. J., has been incorporated to manufacture pipes, fittings, valves, castings, shaftings, etc., with $400,000 capital stock. The incorporators are: Howard M. Ingham, Montclair, N. J.; J. Hopkins Smith Jr., 17 East Forty-seventh street, New York; Warren D. Church, Orange, N. J.

The following companies have been incorporated under the laws of Ontario:

The Canadian Hart Corundum Wheel Co., Ltd., head office Hamilton, capital, $75,000. Provisional directors: Geo. F. Webb, Charles S. Wilcox and Ethelbert Sherk, all of Hamilton, and C. D. Warren, of Toronto. This is an amalgamation of two already existing concerns.

The Robertson Machinery Co., Ltd., head office Welland, capital, $40,000. Provisional directors: Alex. Robertson, George W. Sutherland and Charles H. Hanson.

The Miller Mfg. Co., head office Parry Sound, capital, $45,000. Provisional directors: Geo. B. Miller, George G. Gladman, David Macfarlane and Charles A. Phillips. The company is authorized to control the Canadian patent rights of "Miller's Adjustable Gang."

New Construction:—

The Standard Steel Co., Burnham, Pa., is erecting a large shop at a cost of about $50,000.

The bureau of surveys will soon ask for bids on four large bridges for the city of Philadelphia.

The Fulton Foundry & Machine Co., of Atlanta, Georgia, has erected foundry and machine shops, each 120 x 200 ft., and a large pattern shop and store room at a cost of about $125,000. Modern equipment is being in-

stalled, with the intention of turning out a heavy class of work.

The announcement is made that the new steel plant of the Prescott Co., Marinette, Wis., will be in operation by the middle of December.

The Baltimore & Ohio railroad is to spend about $150,000 in improvements at its shops and terminals at Lorain, O. P. Farrell, of Cincinnati, has the contract.

The Lackawanna Steel Co. will erect 20 batteries of coke ovens at its Buffalo plant. It expects to have 12 of the coke batteries in operation by Jan. 1.

The Morris Machine Works, Baldwinsville, N. Y., will erect two new buildings which will double the capacity of its present machine shop.

The Strong & Northway Mfg. Co., Minneapolis, Minn., has let the contract for a fireproof machine shop of reinforced concrete construction at a cost of $50,000.

The Oregon Short Line is planning to erect a large foundry in connection with its repair shops at Pocatello, Idaho.

The repair shops of the Los Angeles-Pacific at Sherman, Cal., are to be enlarged, several new buildings being constructed. They will include a foundry 36 x 100 ft..

The National Car Coupler Co., Converse, Ind., which closed its steel mill two years ago, now proposes to reopen and enlarge the plant in case residents of the town will pay $15,000.

The new plant of the Broderick & Quinlan boiler factory, Muncie, Ind., is practically completed. Considerable of the machinery is in position. The plant represents an investment of about $100,000.

The Aberthaw Construction Co., Boston, has completed the concrete steel dam 280 ft. long, 70 ft. wide and 40 ft. high on the Mississquoi river at Sheldon Springs, Vermont. The Mississquoi Pulp Co. will make use of the water power.

The Houston, Stanwood & Gamble Co., Covington, Ky., has issued $200,000 of six percent preferred stock for the building of a boiler plant at its engine works. James M. Gamble has sold his interest to Messrs. Houston and Stanwood.

The Flagler Iron & Steel Co., Chicago, has completed three large buildings of steel construction at its new Chicago Highlands plant and has considerable new machinery in place. The plant will probably be put in operation before Jan. 1, making 300 tons of iron and steel pipe and tubes per day.

Near Bloomfield, Ind., the Indianapolis Southern railroad will build a viaduct with a total length of 2,215 ft. It will consists of two 50-ft. approach spans at one end, and two 60-ft. spans at the other, with 17 75-ft. spans and 18 tower spans, each 40 ft. long. The Detroit plant of the American Bridge Co. is manufacturing the steel.

In addition to its new machine shop which the Hercules Gas Engine Works is erecting at San Francisco, Cal., a new foundry plant will be constructed at once. The new site affords abundant wharf facilities and a medium sized marine railway has been installed. Draftsmen and patternmakers are rapidly replacing the designs of patterns destroyed in the recent fire.

Work has been begun on the structural iron and steel plant which is to be erected at Collinwood, O., by a company soon to be incorporated with John P. Cowing, a Cleveland engineer at the head. The site along the Lake Shore tracks has been leveled and the template shop, 40 x 80 ft., is being constructed. The other buildings will be a structural shop 100 x 432 ft., a blacksmith shop 60 x 160, a power plant 50 x 57, a machine shop 60 x 96, a storage house 40 x 80 ft. and an office 50 x 70 ft. The company's capital will probably be $100,000.

General Industrial Notes:—

After an idleness of a year, the plant of the South Milwaukee Steel Co., has been started on small products.

The new foundry at the Stanley Works, Morningside, Pittsfield, Mass., has just been put in operation.

The new furnace at the plant of the Buckeye Steel Castings Co., Columbus, O., has been put in blast.

The Fort Worth Roller Mills, Fort Worth, Tex., have begun the operation of the muck mill.

The old Coxey steel plant at Mt. Vernon, O., is being remodeled into a glass factory, with Leopold Mambourg at the head.

Sweden during 1904 had 133 blast furnaces in blast and produced 4,084,647 tons of iron ore and 528,525 tons of pig iron.

Chile, Mexico and Argentina are endeavoring to manufacture agricultural and mining machinery at home, making use of the native irons.

T. D. Dickson, of McKeesport, Pa., has purchased a site at St. John, Kan., for a large foundry and machine shop.

The Dimmick Pipe Co., Birmingham, Ala., is turning out daily 300 tons of pipe from its new shop which is in full operation.

Large purchases of structural steel for export to the United States are reported in the Westphalian iron market, Germany.

The Carnegie Steel Co. has resumed operations in all departments of its Columbus, O., plant, after an idleness of two years.

The Alabama & Georgia Iron Co., Cedartown, Ga., expects to blow in its warm blast charcoal furnace early next month.

The Red River Furnace Co., Clarksville, Tenn., estimates the ore recently discovered on its property at 1,000,000 tons.

The Huntington Rail Mill Mfg. Co., Huntington, W. Va., has leased the mills of the Union Rail Co., and will manufacture light steel rails from 16 to 40 lb.

The Stearns Co., Erie, Pa., has acquired the plant of the Globe Iron Works to which it has added a machine shop, saw mills, etc.

The Diamond street plant of the Aultman & Taylor Machinery Co., Mansfield, O., has closed down temporarily.

The Helen iron furnace at Clarksville, Tenn., is being overhauled and equipped with the best machinery preparatory to being blown in next month.

The Newcastle Bolt & Forge Co., Newcastle, Pa., is operating to its full capacity with about 175 men employed. The bolt and machine departments are in temporary quarters, but the new buildings to replace those destroyed by fire are rapidly being completed. They are of brick and steel construction.

The transfer of the executive offices of the American Steel Foundries from New York to Chicago will probably not be entirely complete until the beginning of November. The department of advertising and publicity, which is now under the direction of Vice President Lamont, has already been installed in its now home.

H. H. Rice, of Denver, Colo., secretary of the American Hydraulic Stone Co., has been awarded the first prize offered by the Engineering News and Cement Age, New York, for the best paper on "The Manufacture of Concrete Blocks and Their Use in Building Construction." The second prize went to William M. Torrance, New York, assistant engineer in charge of concrete steel design for the Hudson Tunnel companies. The jury was composed of Robert W. Lesley, Richard L. Humphrey and Professor Edgar Marburg.

M. A. Hanna & Co., Cleveland, have assumed control

of the Pennsylvania railroad docks at Sandusky and will install considerable heavy machinery. The firm already controls the docks at Erie, Ashtabula and Cleveland.

The Monarch Road Roller Co. will soon begin the operation of the old American Road Roller Co., Groton, N. Y. Road rollers, traction engines, street sweepers, etc., will be manufactured.

The Baltimore Foundry Co., of Baltimore, Md., which was recently incorporated with a capital of $30,000, has purchased the plant at the corner of Bush and Severn streets and has it in active operation.

No. 3 furnace of the Tennesee Coal, Iron & Railroad Co., South Pittsburg, Tenn., which was built as a 150-ton furnace, averaged for September 202 tons for every 24 hours, and one day poured 230 tons.

The Smeeth Co., recently incorporated at Chicago, with a capital of $400,000, has installed modern equipment for the fabrication of heavy structural iron and steel, paying particular attention to building and bridge work.

The Sylvan plant of the Republic Iron & Steel Co., Rock Island, Ill., has increased its force so that both its 8-in. and 12-in. mills are now being operated practically without a stop.

The Portsmouth Steel Co., Portsmouth, O., has begun operations at its jobbing mill and the complete plant will be started at an early date. The output is placed at 60,000 tons annually and about 750 men will be employed.

At the Clairton plant of the Carnegie Steel Co., 42,700 gross tons of steel ingots were turned out during September. This broke the record which had been made in August of 40,200 tons.

The American Cast Iron Pipe Co., Birmingham, Ala., is receiving bids on jib cranes, cupolas, electrical machinery, complete power house equipment, including engines, boilers, etc., and a complete machine shop equipment.

Washington dispatches indicate that in Government circles it is believed that Sweden will extend to this country after Jan. 1 the benefit of its minimum tariff rates instead of the maximum schedule now in vogue.

M. J. Drummond & Co., of 182 Broadway, New York, who have purchased the Reading Pipe Foundry plant, of Reading, Pa., state that they are as yet undecided as to whether they will operate it or dismantle it and move it elsewhere.

Consul Winter, of Annaberg, through the consular reports, calls attention to the almost unlimited field for railroad building in both Africa and China. He predicts an excellent market for American steel rails and rolling stock in both these territories within the next few years.

Thomas F. Johnston and other manufacturers of Grand Haven, Mich., have purchased the Dake Engine Mfg. Co., and will consolidate it with the Archibald Campbell's Foundry Co. Engines, steam hoists and other heavy machinery will be produced.

The Lancaster iron and steel structural works, of Lancaster, Wis., are being moved to Henryetta, I. T., where the company will engage in the manufacture of steel bridges, prison cells, etc., and will also conduct a general foundry business.

Fires have been lighted in the large 28-in. heating furnace of the Eastern Steel Co. at Pottsville as the first step toward starting work in the plant. Nos. 3 and 4 open hearths will be lighted before Nov. 1 and the entire plant put in full operation, working day and night.

The Somerset Coal Co., a subsidiary of the Consolidation Coal Co., has purchased for $250,000 the property of the Quemanhoning Co., in the Jenner field of the Meyersdale region, near Cumberland, Md. This gives the Somerset company control of 24,000 acres in that district.

Officials of the continuous sheet mill of the American Sheet & Tin Plate Co., Sharon, Pa., state that since the heavy machinery has been installed better results are obtained and the mill will now operate steadily. They report that the experiment of continuous rolling of sheet steel under the Bray system is a success.

The Arion Wire & Iron Works, recently incorporated at Chicago, takes over the business of the Blaurock-Hasty Co., recently dissolved. Nicholas C. Schommer has purchased the interest of O. R. Hasty. Brass, iron and wire work is manufactured.

The Michigan Steel Boat Co., which recently purchased the car barns of the Detroit United Railway Co., will equip its new plant with the most modern machinery. The company has a floor space of about 10 acres and expects to build about 8,000 craft the coming year.

The steel rails on the belt railroad line around Philadelphia are said to be the heaviest in the world, weighing 142 lb. per yard. They are ballasted in concrete with the idea that no repairs will be required for a quarter century.

United States customs authorities have ruled that iron sand must pay duty at the rate of 45 percent ad valorem under the Dingley tariff provision for articles of iron, and that parts of harvesting machines are subject to the 45 percent ad valorem as manufactures of metal and not the 20 percent rate for harvesters.

The Lake Shore railroad is now operating five of what are said to be the heaviest switch locomotives in the world, two at Collinwood, O., one at Ashtabula, and two at Elkhart, Ind. The engines were built at the Brooks Works of the American Locomotive Co., and including the tender weigh 210 tons each. There are five pairs of 52-inch drivers. Bituminous coal is used as fuel.

Plans are under way which will lead to the doubling of the capacity of the plant of the American Skein & Foundry Co., located at Columbus, O. F. E. Stoneman, who was at one time in charge of the Columbus plant, has again been elected a director of the company, and J. E. Davison, who was president of the company, has returned to Columbus and is now vice president of the company and general manager of the Columbus plant. A. M. Walker, of Indiana, is president of the company.

Trade Notes:—

The Case Mfg. Co., Columbus, O., has a big order of cranes for the Pennsylvania railroad shops at Altoona.

Work is being rushed at the Merrill-Stevens plant, Jacksonville, Fla., on the 11 steel barges ordered by the Isthmian Canal Commission.

The United States Hoe & Tool Co., a new manufacturing concern at Columbus, O., has sold its output so far ahead that its traveling men have been called in.

The Mexican Government will need 3,000 iron posts for the stringing of the Federal telegraph wires between Mexico City and Pueblo.

The Lackawanna Steel Co. has secured the contract for 18,000 tons of 90-lb. rails to be used on an electric railway system at Havana, Cuba.

The Lake Superior & Ishpeming Railway Co. has placed an order in Pittsburg for 100 steel ore cars for April 1, 1906, delivery. These cars are duplicates of the 150 already purchased, and have a capacity of 100,000 lb. each.

The Dakota of the Great Northern Steamship Co. sailed from Seattle, Sept. 20, with 900 freight cars and 19 50-ton locomotives on board. These are all built on narrow-gauge specifications, and are ordered by the Japanese Government.